DOCUMENT RESUME

ED 066 314 SE 014 463

TITLE	Scientific and Technical Information for Developing Countries. A Report of an Ad Hoc Advisory Panel of the Board on Science and Technology for International Development.
INSTITUTION	National Academy of Sciences - National Research Council, Washington, D.C.
PUB DATE	Apr 72
NOTE	92p.
AVAILABLE FROM	National Academy of Sciences, Office of the Foreign Secretary, 2101 Constitution Avenue, Washington, D. C. 20418 (Free while supplies last)
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Developing Nations; *Information Needs; *Information Services; International Programs; Reports; Scientific Manpower; *Technical Assistance

ABSTRACT

This report from an ad hoc advisory panel of the Board of Science and Technology for International Development attempts to provide an argument for the importance of systematic scientific and technical information transfer within the framework of the total technical assistance effort. It stresses the need for substantially greater activity and a higher level of priority in providing assistance in this field. Technical assistance addressed to this problem should aim at building and strengthening the "information infrastructure" of developing nations, to create viable information systems that are responsive to changing needs and which can continue to function effectively after the Agency for International Development (AID) assistance to these nations has ceased. The panel recommended 14 suitable action projects. These are presented in summary form. (Author/CP)

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Scientific and Technical Information for Developing Countries

A REPORT OF AN AD HOC ADVISORY PANEL OF THE
BOARD ON SCIENCE AND TECHNOLOGY FOR INTERNATIONAL DEVELOPMENT

OFFICE OF THE FOREIGN SECRETARY

NATIONAL ACADEMY OF SCIENCES
Washington, D.C. • April 1972

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This report has been prepared by an ad hoc advisory panel of the Board on Science and Technology for International Development, Office of the Foreign Secretary, National Academy of Sciences, for the Bureau for Technical Assistance, Agency for International Development, Washington, D.C., under Contract No. csd-2584.

NOTICE

The study reported herein was undertaken under the aegis of the National Academy of Sciences with the express approval of the Governing Board of the National Academy of Sciences - National Research Council. Such approval indicated that the Board considered that the problem is of national significance; that elucidation or solution of the problem required scientific or technical competence and that the resources of the NAS were particularly suitable to the conduct of the project. The institutional responsibilities of the Academy were then discharged in the following manner:

The members of the study committee were selected for their individual scholarly competence and judgment with due consideration for the balance and breadth of disciplines. Responsibility for all aspects of this report rests with the study committee, to whom we express our sincere appreciation.

Although the reports of our study committees are not submitted for approval to the Academy membership nor to the Council, each report is reviewed by a second group of appropriately qualified individuals according to procedures established and monitored by the Academy's Report Review Committee. Such reviews are intended to determine, inter alia, whether the major questions and relevant points of view have been addressed and whether the reported findings, conclusions, and recommendations arose from the available data and information. Distribution of the report is approved, by the President, only after satisfactory completion of this review process.

NATIONAL ACADEMY OF SCIENCES

OFFICE OF THE FOREIGN SECRETARY
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April 1972

Dr. Joel Bernstein
Assistant Administrator
Bureau for Technical Assistance
U.S. Agency for International Development
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Washington, D.C. 20523

Dear Dr. Bernstein:

I am pleased to submit the report of the Ad Hoc Panel on Scientific and Technical Information for Developing Countries. This group was convened at the request of the Agency for International Development in February, 1971, as an ad hoc advisory panel of the Board on Science and Technology for International Development of the Office of the Foreign Secretary. The Panel examined the problem of scientific and technical information transfer to developing countries with particular attention to the areas of natural resources, industrial technology, and scientific and technical disciplines, in accordance with AID's expressed interest.

The Panel's report attempts to provide a reasoned argument for the importance of systematic scientific and technical information transfer within the framework of the total technical assistance effort. It stresses the need for substantially greater activity and a higher level of priority in providing assistance in this field. Technical assistance addressed to this problem should aim at building and strengthening the "information infrastructure" of developing nations, to create viable information systems that are responsive to changing needs and can continue to function effectively after AID assistance to these nations has ceased.

The Panel, after examining the needs and problems in the three priority fields mentioned earlier, considered and recommended 14 suitable action projects. Because of limits on the time and resources needed to provide more detailed individual designs, these projects are presented in very summary form. However, they appear to the Panel to have sufficient merit and probability of successful implementation to warrant serious consideration. As the report indicates, the project ideas constitute discrete efforts that might be undertaken in the short run, either singly or in combination, according to needs and opportunities presenting themselves in particular countries. The list is not exhaustive, nor does it aspire to be a blueprint for systematic programming in the field of information transfer. Given the constraints of time and manpower, the Panel could not extend its deliberations to what it felt should be a second phase of work.

Finally, the Panel is persuaded that an administrative entity, with an appropriate external advisory mechanism, should be established within AID to plan and direct assistance in this area.

I join the Panel in expressing my satisfaction at the concern now being shown by AID towards this vitally important part of the overall effort of strengthening the scientific and technical capabilities of nations in the developing world.

Very sincerely yours,

Harrison Brown
Foreign Secretary

PREFACE

In response to a request from the Agency for International Development (AID), the Ad Hoc Advisory Panel was convened under the Board on Science and Technology for International Development of the National Academy of Sciences in February, 1971, to study the problem of transfer of scientific and technical information to developing countries, and to make recommendations on appropriate activity and programs for technical assistance. This study is one of a series undertaken by special panels of the Board to provide information and advice to the Bureau for Technical Assistance and other interested offices of the Agency, at their request, on questions concerned with the application of science and technology to economic development.

The Panel undertook the following tasks in carrying out its study:

1. to identify the capabilities of less developed countries that need to be developed or strengthened to enable them to acquire and disseminate scientific and technical information more effectively;

2. to identify the types and sources of scientific and technical information, particularly in the fields of natural resources, industrial technology, and the scientific and technical disciplines, pertinent to the needs of developing countries;

3. to define and assess approaches and mechanisms that should be developed by AID to expand the flow of information to and between developing countries;

4. to develop a rationale for technical assistance in scientific and technical information that will provide AID with policy, programming, and priority guidelines; and

5. to recommend specific projects and programs with respect to scientific and technical information that might be undertaken by AID.

The Panel of ten was composed of information specialists and development experts. It met three times during 1971, and was aided in its deliberations by a number of individuals from institutions in the United States and other aid-donor countries, as well as from regional and international organizations. This document constitutes a report of its findings.

BOARD ON SCIENCE AND TECHNOLOGY FOR INTERNATIONAL DEVELOPMENT

* * *

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I

SUMMARY

Scientific and technical information is essential for the development of less developed countries. At present, however, capabilities in those countries for acquiring, processing, and disseminating such information are limited in institutions, trained personnel, and financial resources. These deficiencies result in inadequate information for development planning, inability to use effectively the vast and growing resevoir of information in the United States and other developed countries, and limited outflow of information generated in developing countries themselves.

The formulation of assistance programs in scientific and technical information presents difficulties: the field is itself relatively broad and complex; the key bottlenecks and weaknesses have not been well defined; and the possible remedial measures have not been elucidated.

A rationale is needed to guide the formulation of assistance programs addressed to this problem--a rationale that assesses the role of scientific and technical information in development, identifies the associated bottlenecks and weaknesses in the present system, and provides the basis for formulating assistance programs that would have maximum impact. This report is a first step toward meeting this need.

In Chapter II, we first set forth our reasons for urging greater and more effective use of scientific and technical information in existing and proposed developmental efforts, and we elaborate a rationale--from

the view of both the developing countries and the United States--for increased technical assistance in the matter of scientific and technical information.

Chapter III is a brief review of the functions of the information-transfer process and the necessary components of an information infrastructure, an understanding of which is essential to the development of meaningful technical assistance programs in this field.

Chapter IV focuses more specifically on the information requirements of developing countries in the priority areas (specified by AID) of industrial technology, natural resources, and the scientific and technical disciplines. For each of these, we examine the general characteristics of information users, identify broad types of information needed, and suggest possible approaches for satisfying these needs--at the same time pointing out that such needs, and the conditions associated with them, differ considerably among the three priority areas.

Finally, in Chapter V, we present a series of recommendations on technical assistance in scientific and technical information, encompassing the areas of policy, priorities, programming, administration, and suggested action programs.

Recommendations

The essentials of our recommendations are as follows:

- In the overall technical assistance effort of the United States, high priority should be given to assistance programs that improve the transfer of appropriate scientific and technical information to developing countries.

- This assistance should give primary attention to developing and strengthening appropriate information infrastructures of these countries. Programming should be directed toward developing such functioning infrastructures before major technical assistance programs are phased out.

- Assistance should serve to stimulate the developing countries to give greater attention to the problem of scientific and technical information, including articulation of national policies in this regard, and commitment of indigenous financial and human resources to needed action programs.

- Assistance activities should not take the form exclusively of specially designed projects for the transfer of scientific and technical information, but should also constitute a significant component, wherever relevant, in other AID sector- or problem-oriented programs. In programming information type assistance activities, all forms of aid should be utilized: technical assistance loans, U.S. surplus property, research funds, institutional grants, and use of foreign currencies obtained from the sale of U.S. surplus commodities.

- An organizational entity should be established within AID to implement scientific and technical information assistance activity. It should make use of an external advisory panel for policy and program guidance. AID-sponsored assistance should be coordinated with that of other donor countries as well as regional and international agencies engaged in similar or related efforts.

The following project recommendations are submitted as discrete efforts that might usefully be undertaken, either singly or in combination, accord-

ing to needs and opportunities presenting themselves in the situation of individual countries:

Industrial Development Information

Technical Information Services for Industry

Village Technology Centers

Industrial Equipment and Machinery Information

Natural Resources Information Services of Regional Institutions

Dissemination of Agricultural Practices

Science and Engineering Secondary Literature

Journals for LDC Institutions

LDC "Information Gatekeepers"

Information Education-and-Training Audiovisual Materials

Effectiveness of Information Infrastructures

Information Transfer by U.S. Educational Institutions

Country Information Centers

Counterpart Information Centers

This list is not exhaustive, nor does it aspire to be a blueprint for systematic programming in the field of information transfer. Given the constraints of time and manpower, the Panel felt it could not extend its consideration to what, in its judgment, should constitute a second phase of work.

II

SCIENTIFIC AND TECHNICAL INFORMATION: RATIONALE FOR ASSISTANCE

Scientific and Technical Information in Development

Scientific and technical information constitutes an important and often ignored knowledge base for economic and social development. As is the case for much of "technical assistance," the contribution that information per se can make to development cannot be specified quantitatively. But, we submit, scientific and technical information should be regarded as an essential element of the technical assistance transfer process, along with its conventional constituents--materials, skills, and ideas.

Some benefits likely to result from a larger availability of scientific and technical information to the less developed countries (LDCs) can be cited:

. Improved LDC capability to take advantage of existing knowledge and "know-how" achieved elsewhere

. Rationalization and systematization of LDC research and development efforts in light of knowledge already available

. Wider knowledge base for the solution of problems

. New alternatives and approaches to the solution of technical problems, and options for minimizing future ones

. Improved effectiveness and efficiency of technical activities in the production and service sectors

Applied to these ends, scientific and technical information can

make a critical contribution to the following objectives, among others:

. Increase of food production

. Use of new industrial products and increased industrial productivity

. Improved use and management of natural resources

. Reduction or control of various diseases, and improved health care

. More effective development and use of indigenous energy resources

The pervasive role of scientific and technical information is increasingly recognized by those concerned with the development process worldwide, as is illustrated by the following statements from a recent report of the Organization for Economic Cooperation and Development (OECD):*

> Perhaps the most important event of the next decade will be the recognition of the true value of information--the right information, reliable and relevant to our needs, available in a useful form to all those who need it.
>
> * * *
>
> Impressed with the enormous volume and complexity of contemporary scientific and technical exchange, many see information policy as a complicated problem in documentation management, but fail to see it as a major component of policy for science and technology; But just as science policy must be an integral part of overall government policy, linked to social and economic affairs, information policy must seek to assure that the world's specialized and professional knowledge is fully and properly used in guiding social evolution.
>
> * * *
>
> Appraisal of the proper balance between internal self-sufficiency and international interdependence must be made by each country. No nation can be truly self-sufficient in scientific and technological information, since such information is generated throughout the entire world and scientific truth is universal... This implies that a nation needs an internal system to enable it it to take advantage of the entire world's technical output, plus the ability to obtain and use information of strictly national importance.

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*Organization for Economic Cooperation and Development. Ad Hoc Group on Scientific and Technical Information. INFORMATION FOR A CHANGING SOCIETY. SOME POLICY CONSIDERATIONS. Paris, September, 1971. pp. 17, 18, 38.

The United Nation's World Plan of Action for the Application of Science and Technology to Development* expresses similar sentiments:

> A country without an indigenous scientific and technological capacity has no means of being aware of its own needs, nor of the opportunities existing in science and technology elsewhere, nor of the suitability of what is available for its own needs.
>
> * * *
>
> The Second United Nations Development Decade should...provide for a systematic and adequately supported effort to improve the facilities and arrangements for the transfer of existing knowledge and technology from developed countries to less developed ones. Developing countries require scientific and technical information systems of their own, suited to the type, capacities and location of the producers and users of such information, and giving emphasis to the type of knowledge most needed for economic and social development. Such internal systems must be effectively connected with the information network of the highly developed countries.

Among the various bodies that have advocated or provided various types of information assistance to developing countries are (a) international and regional governmental organizations, such as the United Nations and its constituent bodies, the Organization of American States (OAS), and the previously mentioned Organization for Economic Cooperation and Development (OECD); (b) international nongovernmental scientific and technical organizations such as the International Council of Scientific Unions (ICSU) and the International Federation for Documentation (FID); (c) technical assistance agencies of some donor countries; (d) domestic organizations such as land-grant universities, foundations, and voluntary

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*United Nations. Department of Economic and Social Affairs. WORLD PLAN OF ACTION FOR THE APPLICATION OF SCIENCE AND TECHNOLOGY TO DEVELOPMENT. Prepared by the Advisory Committee on the Application of Science and Technology to Development for the Second United Nations Development Decade. (E.71.II.A.18) New York, 1971. pp. 31, 49.

associations; and (e) private enterprise.* Concurrently, the more advanced of the developing countries have made efforts to strengthen their capabilities to acquire and utilize effectively the information available to them. The allocation of scarce resources for this purpose is a measure of the value that these countries attach to information.

Information Assistance: Developing Country Perspective

For the most part, developing nations have extremely limited capabilities and resources, both human and financial, to devote to the production of scientific and technical information. It has been estimated that they now produce less than 5 percent of the world's scientific literature and perhaps an even smaller proportion of the total technical information. Thus, information must be added to the numerous other gaps that separate the developing from the developed world. Moreover, the information gap is probably widening--a consequence of the rapid rate of growth of scientific and technical literature in the advanced, industrial countries.

Clearly, the LDCs must turn to them to obtain much of the currently available scientific knowledge and technical know-how, as embodied in literature and other forms of information storage, needed for development. Yet the LDCs are lacking the essential capabilities required to transfer

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* During the course of its deliberations, the Panel and its staff identified a number of information assistance programs, ranging from the extensive operations of the U.N. Industrial Development Organization (i.e., its Industrial Inquiry Service, Seminars and Training Programs for LDC Information Officers, and Publications Program) to the proposed programs of the recently established Canadian International Development Research Center. Information on such programs and on developing country plans is being maintained and updated by the NAS Board on Science and Technology for International Development. A number of these programs and plans are described in the publications listed in the bibliography of this report.

information and to channel it to ultimate users within a country. In fact, the underdeveloped state of indigenous capabilities for acquiring and putting to use such information must be considered a pivotal deficiency.

In this report we shall refer to these capabilities as a country's information infrastructure, of which the major elements are

1. A nucleus of physical information resources (libraries, documentation centers, etc.);

2. A supply of trained library and information personnel;

3. Linkages to significant economic, educational, and R & D sectors--internal and external;

4. Two-way communication channels with users;

5. An organizational system that brings together and energizes these resources, personnel, and linkages; and

6. National policies that promote the systematic development of the infrastructure.

The developing countries are generally deficient in all of these aspects. In some instances, infrastructure does not yet exist; in many others it is too embryonic to meet growing requirements. As a result, such countries are unable to identify their information needs adequately, to acquire pertinent information, to adapt it to prevailing conditions and requirements, or to disseminate it to those who need it. The "information gap" between the developed and developing nations with few exceptions is very wide, indeed.

The establishment of a well-functioning information infrastructure is the necessary first step in closing this gap.

This infrastructure, capable of drawing on worldwide sources of scientific and technical information, will serve the individual country as the prime coupling mechanism between its users and the creators of information everywhere. If developed properly, it should serve to stimulate an "information consciousness" among potential information users (who are outside the infrastructure, but linked to it). They, in turn, will look increasingly to the infrastructure for services.

An adequate information base can help reduce the need for foreign experts, and encourage the more rapid training and utilization of indigenous expert manpower. Improved accessibility to externally generated information can reduce a country's need to undertake time-consuming research and development for which its finances, facilities, and personnel are inadequate.

Finally, assistance designed to open up sources of information and increase national capabilities for assimilating information responds to the desires of LDCs for greater self-determination in their own development. In leading LDCs to an informed autonomy, an effectively operating information infrastructure can do much to allay their growing skepticism of both the suitability of the technology being transferred to them and of the motivations of donor and investors. Information aid is inherently less obtrusive than many other types; it does not violate the political and other values, or prerogatives, of the receiving countries. This distinct advantage derives from the neutral character of most scientific and technical information; the multiplicity of sources from which such information can be obtained; and the choice that the LDCs can exercise in its use.

Information Assistance: U.S. Perspective

Scientific and technical information provides an especially appropriate and timely field for United States assistance activity, in light of our national objectives, the new directions in aid programming and organization, and the cost/benefit advantages.

Information assistance conforms to a basic tenet of U.S. foreign aid, namely, to share our knowledge with those who need it.*

A related key objective of U.S. development strategy is to help LDCs in "institution building," that is, in acquiring the institutional or social infrastructure that will give them the capability to identify their own problems and to bring their own human and material resources to bear on these problems. In this U.S. strategy, the role and value of a viable information infrastructure have thus far been given almost no attention; yet, in our judgment, the effective use of information is an indispensable part of such a capability.

The point is of particular relevance to so-called AID "graduate" countries and others approaching that situation. An information infra-

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*Nixon, Richard M. U.S. FOREIGN POLICY FOR THE 1970's: BUILDING FOR PEACE. A Report to the Congress by the President of the United States. Washington: The White House, February 25, 1971, pp. 220-221.

U.S. Federal Council for Science and Technology. POLICIES GOVERNING THE FOREIGN DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION BY AGENCIES OF THE U.S. FEDERAL GOVERNMENT. Washington: U.S. Government Printing Office, March, 1968.

U.S. Department of State. NATIONAL POLICY STATEMENT ON INTERNATIONAL BOOK AND LIBRARY ACTIVITIES. Press Release and Text of Statement. Washington, January 12, 1967.

structure has the inherent capability to continue relationships with external information sources even after formal U.S. capital and technical aid are discontinued. The development of a well-functioning information infrastructure before the phasing out of formal technical assistance programs should be a key element in development strategy, and a significant prerequisite for qualifying a country as an AID "graduate."

Furthermore, the new directions in U.S. development strategy would suggest greatly increased need for effort in the information field. The Administration-sponsored International Development Institute (IDI),* a foundation-like institution intended to succeed the Agency for International Development in providing U.S. technical assistance, is to "focus U.S. scientific, technological, and managerial know-how on the problems of development." Whatever IDI's eventual mode of organization and operation, the transfer of scientific and technical information would surely be an integral part of a mandate to spur innovation and to increase the capacity of LDCs to join in the process. Indeed, the success of the new orientation in technical assistance may well depend upon the effectiveness with which scientific and technical information is transferred to, and put to use by, the LDCs.

Another factor in the changing U.S. assistance program is the reduction in size of the AID missions abroad. In the past, the missions themselves have functioned to some extent as information sources, more as the coupling mechanism between LDC and U.S. information sources. It has been

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*See National Academy of Sciences, THE INTERNATIONAL DEVELOPMENT INSTITUTE, a Report of an Ad Hoc Committee of the Board on Science and Technology for International Development. Washington: July 1971.

estimated* that AID receives and processes some 10,000 technical inquiries annually from individuals and institutions in developing countries. About half of these are handled by AID missions and the headquarters regional bureaus; the rest are channeled to the Bureau for Technical Assistance and other central AID offices. An additional 10,000 or more inquiries are received annually by U.S. agencies and organizations that receive funds from AID specifically to enable them to respond to such inquiries; many of these inquiries come to them through the channel of the AID missions. The reduction in the size of the mission will make it difficult, perhaps even impossible, for this valuable information service to be continued at its former level. Assistance to strengthen local capacities to acquire and disseminate information to meet local inquiries would help fill this breach.

Yet a further argument for an active U.S. role in providing technical assistance in the information field derives from the obvious advantage that the United States possesses in science and technology and particularly in the development of information systems and services. Its preeminence in this regard would seem to qualify the United States for a distinct role in information assistance to developing countries that other donor nations and international agencies are not in a position to match.

Finally, there is the question of costs and benefits. As we have said, quantitative comparisons cannot be made, but experience suggests that scientific and technical information constitutes a relatively low-

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*Official communication from Office of Science and Technology, AID, to Office of Science and Technology, Executive Office of the President, November 27, 1970.

cost/high benefit field of endeavor. The same information may be relevant to several different situations; information possesses long-term effectiveness; and it can sometimes be substituted for expert advisers. In addition, an LDC information infrastructure, once well established, can continue to function on its own momentum, without additional infusion of aid.

Information Assistance and AID

There is hardly a major technical assistance program that does not, at least implicitly, have information transfer as a principal component. Other AID activities, including some capital-loan programs, in themselves constitute channels for transferring information to developing countries. Very few projects, however, have focused explicitly on the processes and mechanisms for transferring information; the emphasis has been almost exclusively on specific content.

The flow of information between developed and developing countries is analogous in many respects to the flow of money. The value of both is established on the basis of what can be done or gained with them. Both are essential inputs to every aspect of development. Each has properties that determine effective methods for its transfer. These methods, as they are institutionalized, reflect the differences in the culture where they are in use. Short-term measures to improve their flow often need to be taken, but the effectiveness of these measures will depend on how consistent they are with each other and with some overall sense of direction.

There is a widely accepted body of theory regarding the flow and transfer of money, but there is a paucity of knowledge regarding the flow and transfer of information. Information-oriented activities have received

surprisingly little critical attention and analysis from the development community in spite of the prominent role such activities play in the overall assistance effort. In part, this neglect may be due to the fact that information runs through all other types of assistance. Whatever the cause, the result of the inattention within AID and other donor agencies has been a lack of a coherent doctrine on information assistance that clearly, and in a compelling manner, shows its intrinsic relevance to the total development effort.

We have attempted here to elaborate such a doctrine. The development of an approach to information assistance--with suggestions as to focus, priorities, and programming--will be treated in subsequent chapters.

III

INFORMATION TRANSFER AND INFORMATION INFRASTRUCTURE

The transfer of information must be viewed as involving, first, a set of functions that comprise the information-transfer process, and second, a set of policies and resources--the information infrastructure organized to support those functions. From this dual view, guiding principles can be developed for effective approaches to assistance and for setting realistic development targets. In this chapter, we discuss the principles that should apply to the choice of specific actions. In the next two chapters, our suggested projects reflect these principles.

Information Transfer Process

Effective information transfer depends principally on the following five functions:

1. Recognition of Need for Information
2. Definition of Needed Information
3. Targeting of Requests for Information
4. Retrieval, Processing, and Dissemination of Information
5. Feedback Critique

Need Recognition. An awareness of the need for information is a prerequisite for its effective transfer, but measures to foster such awareness are much less understood than are the techniques for the actual search, retrieval, and delivery of information.*

*The complexity of the task involved in recognizing the need for information and in deciding to seek it is illustrated by the flow diagram in Appendix A, page 62.

Need Definition. A different kind of expertise comes into play as the recognized need is translated into a demand for information. The need must be transformed from the context of a specific problem into the conceptual and linguistic framework of science and technology--the framework in which the pertinent information is organized. This step is an important interface between those who need the information and those who will assist in obtaining it; a definition that is valid and intelligible on both sides is required for the successful completion of the transfer process.

Targeting the Request. The defined need is now an inquiry that must be directed to the sources of information that can possibly respond to it. The inquiry may be channeled directly to the proper information sources, when they are definitely known; or the channeling may be indirect because one or more intermediaries are involved. Because of the large number of intermediaries that may participate in this, and in subsequent stages, it is essential that steps be taken to minimize delays and distortions of the inquiry.

Retrieval, Processing, and Dissemination. Information responsive to the inquiry must be located, acquired, and packaged. Recycling at this stage is not uncommon; the information that is obtained may uncover flaws in the original definition of the need, or distortions in the transmission and processing of the inquiry. Recipients of this information throughout the transfer process will make use of it in their collections, adding to and reorganizing it as appropriate, and providing for its further dissemination to others in related activities. The originator of the inquiry, in the

meantime, must be assured that the results of all this processing meet the criteria of relevancy, comprehensibility, and applicability. The information received must be responsive to expressed needs, it must be intelligible, and it must be applicable to the immediate task.

Feedback Critique. At all stages in the transfer process, critical information about the pertinency and timeliness of the results should flow throughout the system. Only from information such as this can the information services be systematically assessed and improved. In addition, maximum use should be made of the transferred information; information provided one user often can be useful to many others in the same country or in other developing nations. The institutions engaged in the transfer of information, therefore, should communicate also to potential users the existence of the initiating problems and the availability of information pertinent to dealing with them. At present, the general state of knowledge about effective and efficient transfer of information has many gaps. Therefore, feedback information regarding the performance of transfer operations and programs must be systematically obtained.

Information Infrastructure

The prime purpose of a nation's information infrastructure is to carry out the functions of the information-transfer process, and the performance of this task is a measure of its effectiveness, an indicator of its stage of development, and a criterion for defining areas of assistance and setting development targets.

As discussed in Chapter II, the information infrastructure of a country consists of facilties, institutional resources, and manpower devoted

to information activities, links to user communities, as well as the effective harnessing of these elements and the body of official policies for developing and utilizing them. Since the national infrastructure varies from the minimal discrete resources found in a country at the lower end of the scientific and technological scale, such as Indonesia, to the more elaborate systems of countries at the upper end of the scale, such as India and Brazil, the point of departure for strengthening the infrastructure can properly be sought at any level of national development.* The major elements and components of the infrastructure that need to be considered in devising assistance programs are presented in a checklist at the end of this chapter.

Examination of this checklist in relation to the situation of a particular developing country should immediately suggest various approaches to program development. Program choices, of course, will need to be made so as to strengthen those elements of the information infrastructure that are appropriate to the LDC in question, consonant with its general level of development, and tailored to its capabilities, resources, and needs. Assessment, therefore, should take into consideration a variety of factors--government information policies, operation of existing information-handling efforts, rate of progress in overall development, projected information needs, and the like--to arrive at realistic information-development targets. This approach would suggest, for example, that a costly computer-based

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*An approach to the development of infrastructure at progressively more sophisticated levels is presented in BASIC ELEMENTS OF PLANNING AND DESIGN OF NATIONAL AND REGIONAL INFORMATION SYSTEMS, a report prepared for the Organization of American States by Battelle Memorial Institute, Columbus, Ohio, May, 1971.

information service should not be started in a country that lacks a computer-utilization base or the requisite trained manpower.

Scientific and Technical Libraries. The first concern of any information-development assistance must be to assure an adequate base of library operations. Simple information services--extended on the basis of materials acquired, organized and managed in accordance with current library practices--provide the necessary underpinnings for expanding a country's information-management system. The material in such collections should not be limited to printed documents, but should include records in other media as well; the clienteles served should be systematically broadened to include varying levels of competence; and the techniques for assuring the use of these resources need to be numerous and imaginative. Especially important are the informal, user-oriented approaches that cast the information custodian in an active role and encourage direct interactions with the information user. Such basic library-focused information activities develop habits, provide education, and serve as a proving ground for users, information managers, and development planners alike. In short, they serve to promote an"information consciousness." Such activities can be simple and inexpensive, without sophisticated and costly equipment.

Documentation and Specialized Information Centers. Generalized documentation centers differ little from active special libraries for science and technology. Either may be depended upon to prepare announcement bulletins, provide photoduplication services, and perform reference work, investigating answers to specific questions. Both acquire and organize

the publications and the technical report literature of the sciences and technologies.

The documentation centers attain a higher level of intellectual sophistication when they become specialized and acquire the added function of evaluation. This introduces a requirement for professional experience in the pertinent scientific or technical fields covered by the centers. The Specialized Information Center (or Information Analysis Center) is an emerging form of service institution in the industrialized countries. Its use should be carefully studied for potential exportation to developing countries where information needs are characterized by a large requirement for evaluation of the information being provided.

External Information Traffic. Information activities that are technically more demanding and involve regular information flows from abroad (as distinct from library-development effort, which may be largely a matter of strengthening acquisitions) should avoid the establishment of many separate channels reaching from far outside the country directly down to individual users within it. Instead, technical assistance should encourage indigenous information-processing institutions through which individuals and institutions may establish sustaining contacts with external information systems. In this manner, information traffic from abroad serves to build up national resources of know-how, trained manpower, and competent institutions.

Such a linkage with transnational information organizations can be established by any one of many institutions: in the field of natural resources, including agriculture, probably a government office in the appro-

priate ministry; in industrial technology, national research institutes, industrial associations, or professional societies; and in science information, the country's universities. Whatever the institutional type and financial sponsor, it must have a broad clientele of active users with whose working needs and habits it is closely coupled--an arrangement needed both for responding to clients and for shaping their inquiries.

At a more advanced stage of development, the interface or linking institutions may have a network of more specialized information centers, each of which concentrates on a specific subject--such as medicine, agriculture, or public health--or serves a specific region with information on several subjects. Such documentation/information centers will provide the institutional base necessary for participating in larger programs for international cooperation, such as the World Science Information System proposed in the UNISIST Study.*

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*Under the joint auspices of UNESCO and ICSU, a 4-year study on the improvement of the international communication of scientific and technical information has been completed, and reviewed by an Intergovernmental Conference in October, 1971. Two of the study's recommendations bear upon the problems of information transfer to developing countries. The first, directed to governments, calls for the establishment in each developing country of a national agency responsible for the planning and coordination of the development of information resources. The second, directed toward UNESCO as the manager of a future UNISIST program, calls for better coordination of the assistance programs of intergovernmental and governmental agencies, as well as a limited number of pilot projects designed to link developing countries to the sophisticated information systems that are coming into use in the industrialized countries.

At the Intergovernmental Conference, delegations of the developing countries showed great interest in these proposals, and insisted upon priorities being assigned to the satisfaction of their needs. The Conference resolution specifically recommended that, "special attention be paid to the complex and urgent needs of the developing countries and in particular their need for scientific and technical, as well as economic and social, information for training (notably by scholarship programs), and for provision of adequate infrastructure, and for stimulating or initiating new systems when needed" (continued next page).

Manpower. Because the effective transfer of information depends upon the skills of librarians and information specialists, a continuing program to improve their professional skills is needed. Elements of such a program include

1. Workshops, seminars, short courses for in-service training and continuing education programs;

2. Academic programs for information, documentation, and library education within the country, keyed to national needs; and

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A new UNESCO program implementing these recommendations will be proposed to the General Assembly of UNESCO meeting in October, 1972. Although the size of any new program to be undertaken will, of course, be dependent on the resources available, the following observations bearing on our report may be made:

1. The interests of a large number of developing countries have been aroused at the governmental level, and their attention has been focused on the fundamental requirements of infrastructure and a responsible public agency.

2. In anticipation of the Intergovernmental Conference, UNESCO convened a meeting of U.N. specialized agencies, thereby taking the first step toward improving coordination at the U.N. level.

3. In May, 1972, UNESCO will convene an Ad Hoc Working Group, with representatives from developing and developed countries, including the U.S., to review information needs and requirements of LDCs, to review ongoing assistance programs to LDCs by national and international bodies, and to advise UNESCO on actions to be taken within the UNISIST program.

The impact of the UNISIST study and Intergovernmental Conference on the future course of information transfer to the developing countries should not be overestimated. On the other hand, this new initiative has resulted in a better focus on the problems involved, and hopefully improved coordination among the national and international agencies attempting to resolve them. For further details on the UNISIST Study, see the following publications:

UNESCO and the International Council of Scientific Unions. UNISIST: STUDY REPORT ON THE FEASIBILITY OF A WORLD SCIENCE INFORMATION SYSTEM, Paris: UNESCO, 1971, 161 pp.

_____. UNISIST: SYNOPSIS OF THE FEASIBILITY STUDY ON A WORLD SCIENCE INFORMATION SYSTEM. Paris: UNESCO, 1971, 92 pp.

_____. FINAL REPORT, INTERGOVERNMENTAL CONFERENCE FOR THE ESTABLISHMENT OF A WORLD SCIENCE INFORMATION SYSTEM, PARIS, 4-8 OCTOBER, 1971. Paris: UNESCO, December, 1971, 60 pp.

3. Advanced professional training, including study and observation abroad.

Links with User Communities. An information infrastructure must be responsive to the needs of its ultimate users, and an interacting relationship between the two must be cultivated. Neither can develop effectively in isolation from the other. As the infrastructure evolves, it will be necessary to keep promotion of services in step with capabilities for providing them. In this connection it should be noted that several of the Panel's project suggestions qualify as "promotional," since they seek to inform specific audiences and to catalyze their employment of information resources.

National Policies. At all stages, the development of documentation and information services to aid transfer of technology should be a part of national economic planning and policy. The government should be willing to allocate funds for this purpose and to establish an institution, or agency to exert professional leadership. The information agency should work with and advise executive and legislative bodies on setting up budgets, preparing enabling legislation, and providing leadership for information programs. There should be a substantial program to develop the staff and strengthen the collections of the institutions most directly concerned with national growth--universities, technical institutions, productivity centers, export promotion centers, development banks, central statistical institutes, book production centers, and the like. All efforts should be coordinated with foreign assistance agencies, international agencies, foundations, and voluntary organizations.

Moreover, it should be a part of such policy to encourage the publication of the results of all indigenous nonproprietary scientific and technical research, development, and applications. The habits of searching for published research and technical activities, and recording and publishing one's own, go hand in hand for both nations and individuals.

INFORMATION INFRASTRUCTURE: A CHECKLIST

I. Governmental Policy for Information

A. Does the government have a national policy for scientific research and development?

B. If so, does it have a national policy for scientific and technical information?

C. Is there a government agency serving as a focus for information policy formulation?

D. What percent of the national research and development budget is spent on scientific and technical information?

II. Manpower Resources

A. Existing

1. What is the number of trained personnel? What is the estimated national need?

2. To what extent has their training been indigenous; to what extent outside the country?

3. Are the information and library professions, and information specialists in other professions suitably compensated?

4. Are there nationally recognized standards for education and training in the information sciences?

B. Potential for Training Manpower

1. What is the capacity of indigenous training institutions?

2. Is there fiscal support for trainees--within, or outside the country?

3. Do U.N. agencies or nongovernmental organizations (including private companies) sponsor indigenous training programs? Fellowships for training overseas?

III. Information Resources and Facilities

A. Libraries, specialized information and documentation centers

1. What is the volume, character, and quality of information resources? Have they been selected in relation to development needs?

2. Are they appropriately distributed geographically in relation to user needs?

3. Have they been adequately organized for use?

4. What types of information services do the centers provide? Are they appropriate to the needs?

5. What populations are being served? How do the centers reach them?

6. What is the level of fiscal support given these institutions?

B. Publication Capabilities

1. What is the status of the scientific and technical periodical press? Book publishing?

2. What abstracting and indexing services exist?

3. What is the status of scientific and technical book imports?

4. What translation capabilities exist in the sciences and technologies?

C. Computer Capabilities

1. What resources (hardware, trained manpower) exist?

2. What is the overall status of computer application?

3. Are proposed tasks significant and large scale enough to justify computer application? Can economies be demonstrated?

IV. Institutional Resources

A. What governmental ministries and programs have roles in technology transfer through information?

B. What regional or intergovernmental economic development organizations operate within the country for the same purpose?

C. What nongovernmental organizations, including scientific and technical societies, have related interests?

D. Do the universities and technical colleges provide services to industry for technology transfer?

E. What role does industry, including multinational companies, play in effecting technology transfer?

IV

INFORMATION NEEDS IN PRIORITY FIELDS

The Panel, in accordance with its charge, confined its deliberations to three major areas of information need: industrial technology, natural resources, and the scientific and technical disciplines. The first two are major priority fields for development, and the third is crucial to education and research in the developing countries.

The three areas are, of course, not mutually exclusive. Industrial technology, for example, often reflects the natural resources of a country, and it may be used to exploit them; science is relevant to the development of technology and to methods for exploiting natural resources. However, the information needs and conditions associated with those needs differ considerably among the three.

For each area, the Panel examined the general characteristics of the information users (as they bear on information needs), identified the broad types of information needed, and suggested approaches for satisfying the needs.

Industrial Technology

Among LDCs as a whole, "industrial technology" includes village-level handicraft industries and small-scale light manufacturing, as well as medium- and large-scale heavy manufacturing. The typical firm is small, and in many instances, one enterprise produces a large variety of products, usually in short production runs. Few have their own information services.

The types of information needed are not limited to production, but cover virtually all aspects of industry. The major categories, briefly described, are listed:

Manufacturing methods, including numbers and types of required machinery, performance characteristics, maintenance and power requirements, quality control, labor requirements, and costs.

Determination of technical and economic feasibility, including possibilities for the use of indigenous resources, new industrial uses for by-products, and adaptation of technologies to the local relative prices of inputs.

Suppliers of equipment and formulas for products, including the names and addresses of suppliers, types of machinery available, costs, conditions for purchase, and delivery procedures and schedules.

Standardization and standards, including standardization systems, standards adopted by the industrialized nations and other LDCs, industrial regulations, testing facilities, specific product standards, and materials specifications.

Markets and marketing, including data on present and future markets, international prices and trends, exporters of products concerned, and productivity and production rates of other nations.

Administration and management, including methods of organizing industrial enterprises, enterprise planning and management, project planning, accounting, and personnel management.

Planning information, at the governmental level, including the processes of industrialization, mix of inputs (economic, technical, and manpower) needed, industrial planning methodologies, and government policies.

A great deal of this information, especially in manufacturing, flows through commercial channels--that is, from a firm in a developed nation to its affiliate, or to a local enterprise, in a developing country. The "flow mechanism" may be by licensing arrangements or sale of patents and related know-how. Usually such technology transfers are accompanied by training of those who will use the information provided.

Because little attention has been given to the particular information needs of industry, few information services have been devised to serve it. This situation reflects a lack of appreciation of the possible beneficial effect of information on industrial practices. Stimulating demand for new information should therefore be a first priority.

The next step is providing information services that are "designed to cater to the individual needs of a specific industrial customer by supplying precise information for the solution of problems"* and in a form that is easily understood. Centralized documentation centers alone do not meet these needs, which must be satisfied by organizations and staffs who are well acquainted with particular types of local industry and their needs. Information obtained from developed nations must be carefully selected and adapted to the prevailing conditions of the LDCs, because much of this information is applicable to industries that do not yet exist in developing countries.

Levels of Industrialization. Since many LDCs are in the early stages of industrialization, assistance aimed at helping them to plan and promote industrial growth would be especially useful. The information needed for

*U.N. Industrial Development Organization. INDUSTRIAL INFORMATION. UNIDO Monographs on Industrial Development, No. 13. New York: 1969, p. 25.

this purpose should include strategies for industrial growth, appropriate technolgies and employment, considerations involved in selecting sectors for development, and the plans adopted by other LDCs.

For LDC industries that employ fairly modern technology, assistance should focus on strengthening and expanding the capabilities of local institutions that already have, or can establish, close working relationships with industry. Services provided by these institutions should include the identification of specific information needs, the acquisition of pertinent information, and the tailoring of it for direct application by industry.

Village-level industry is important in many developing countries because it is labor-intensive and capital-saving. However, little of the scientific and technical information from developed countries is directly applicable to village industries; and, in any event, local customs often hinder the acceptance of improved technologies. Therefore, the information-assistance approach will differ from that for more "advanced" industries. Primarily, it must emphasize the development and adoption of technologies appropriate to the skills, resources, and attitudes of villagers.

One possible approach to this problem is the establishment of village technology centers, located in the countries concerned and staffed largely by indigenous personnel. Such centers would have the responsibility for identifying needed technologies; adapting available technologies, or developing new ones, to meet these needs; and introducing and disseminating them on a wide basis.

Commercial Channels. The transfer of information and technology between the developed and developing nations often takes place within commercial channels, through foreign investment, joint ventures, or the sale or licensing of a new product or process. This method of transferring information lies outside the scope of this report, but we do not underestimate its significance. (Another panel of the NAS Board on Science and Technology for International Development is currently considering the role that multinational firms can play in promoting the development of indigenous research, development, and engineering capabilities within the LDCs in which they operate. Its findings will shed additional light on this subject.)*

Natural Resources

Interpreted broadly to include agricultural, forest, mineral, and water resources, the natural resources field has a diverse assortment of information needs and users. For example, planning ministries need information on the overall management of the country's resources, and individual farmers need information on simple agricultural practices for soil preparation and harvesting.

Describing Resources. However, in all these situations, there are essentially two types of information that may be transferred--data on the physical characteristics of the resources themselves and data on techniques for exploiting them. Ordinarily, the first type of information is obtained

*Report of the NAS Ad Hoc Panel on the Role of U.S. Multinational Firms in Strengthening Research, Development, and Engineering Capabilities in Developing Countries (in preparation).

from natural-resource surveys and is not the subject of international transfer. However, where countries have common borders, there are situations in which international transfer of data is useful and necessary, such as hydrologic, meteorological, and certain types of oceanic data. Organizations from one country (e.g., the United States) may also develop data on the characteristics of certain resources within another country which the latter does not possess. This can happen in connection with ventures in private investment; with the analysis of existing aerial photography; and, on a large scale, the interpretation of data from the forthcoming earth-resources satellites. In addition, information of this type may be generated during international scientific research projects conducted in the field (e.g., the Woods Hole hydrographic studies). Often, the information obtained in these ways is not routinely made available to the countries concerned. In view of the potential usefulness of these data, ways and means for ensuring its return to the subject country, wherever feasible, should be actively considered.

Exploiting Resources. The second type of natural-resource information is relevant, directly or indirectly, to finding resources, evaluating them, preparing plans for their exploitation, and exploiting or managing them. This is a category of information that focuses on methods and techniques; it covers a wide range of possible applications, including methods for mineral and fish search, evaluation of tropical forest stands, water management for irrigation, design of mineral exploitation, decisions on when to plant corn or how best to clear land, and so on.

Information-assistance activities should concentrate on the transfer

of this second type of information, part of which is intended for ministries or associated institutions that deal with planning and natural resources. However, since many existing national institutions have limited capabilities, assistance to appropriate regional organizations often could achieve a productive effect. Several such organizations, especially in Latin America, already are active as documentation, research, and/or training centers (e.g., Inter-American Center for the Integrated Development of Water and Land, Pan American Center for Evaluation of Natural Resources, and the Organization for Tropical Sciences). These organizations can serve as channels through which externally generated information flows to appropriate national organizations in LDCs. Just as important, they can channel information between LDCs, which often have more pertinent information on natural resources than do developed nations. Assistance aimed at improving and expanding the information services of these regional organizations could also help to develop the capabilities of the national institutions themselves. The important role of the regional institution and its interactions with national organizations is well elucidated in the Jackson Report.*

Agriculture. Agriculture is different from other natural resources in its scope, characteristics, and requirements. Generally, the need for and importance of information services for agriculture have been more widely recognized than for other kinds of natural resources. However, extension services designed to serve the needs of small farmers are still

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*U.N. Development Programme. A STUDY OF THE CAPACITY OF THE UNITED NATIONS DEVELOPMENT SYSTEM. U.N. Publication D.P./5. New York: United Nations, 30 September 1969. 2 vols.

far less than sufficient to their task, especially in reaching a larger number of traditional farmers with information about simple ways to increase productivity. The promotion of the new wheat and rice varieties gave agricultural agencies valuable experience in the transfer of information through extension and related services. Methods were devised in one successful scheme for presenting the farmer with seeds, fertilizers, and other required materials in an integrated package for direct use on a hectare of land, thereby minimizing the skills needed to use the new grains and greatly reducing the amount of information that had to be transferred in explicit terms. Innovative approaches toward packaging and presenting information on ways to raise farm productivity will be required to inform the large numbers of farmers in the world, most of whom are illiterate.

Scientific and Technical Disciplines

In LDCs, the principal users of scientific and technical information are scientists and engineers who are engaged in (a) teaching scientific and engineering students in universities, (b) research in educational, research, of technical institutions, and (c) research and development in industry. The dissemination of science information is different from, and in some respects easier than, transferring industrial-technology and natural-resources information because of the nature of the users and the channels for dissemination. There is a system of open publication by researchers (except perhaps those engaged by industry) organized around scientific journals. In addition, interpersonal relationships within the world scientific community often provide an effective basis for the ex-

change of information.* Individual scientists customarily accumulate literature of interest to them; and there are more often libraries and related facilities for serving their information needs.

Nevertheless, the LDC scientist may encounter problems in obtaining information. Frequently, the libraries to which he has access have limited and incomplete collections of journals and other literature; procuring such materials is costly and time-consuming; funds for translations are limited; and reproduction equipment is in short supply.

The engineer faces similar problems. Technical journals, engineering standards, research reports, manuals, handbooks, etc. are often unavailable or difficult to obtain. Further, the practicing engineer does not usually have the interpersonal and institutional resources available to the scientist.

Perhaps the most needed and generally useful type of information for both professions is obtained from secondary literature. Providing major annual indexes, abstracts journals, annual reviews, and handbooklike publications could help to increase the awareness of, and access to, the world's literature by LDC scientists and engineers. But such secondary information tools must be complemented by means of access to the primary scientific and technical literature--means that are prompt, inexpensive, and convenient.

The role that U.S. technical societies and publishers of scientific and technical journals could play in making their journals more easily

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*Such relationships are often characterized as "invisible colleges."

available to LDC educational and R & D institutions deserves renewed and earnest exploration.*

Barriers to the Acquisition of Information

The acquisition of scientific and technical information in these fields from abroad, in both printed and other forms, is often hampered by LDC currency exchange and import controls.

In some countries, individuals or institutions have difficulty in obtaining convertible currency at all; in many others, the time and effort involved to obtain convertible currency serves as an effective deterrent. The purchase-coupon scheme established by a donor country or agency provides a way around this barrier. The coupons, made available with or without a subsidy, could be used by individuals or institutions in LDCs to order information materials from abroad. The task of converting local currency to foreign exchange would fall on the agency distributing the coupons, instead of each individual purchaser.

It appears, however, that at least one trial of such a coupon scheme (by UNESCO) has not functioned well and has failed to reach very many indivuals. Clearly, the most effective approach is for LDCs to recognize the value of information for the needs of the society, and to relieve its importation of exchange controls. The articulation of a national policy on information should go a long way toward solving this vexing problem.

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*The problems of access to scientific publications are well illustrated in the following report: International Council of Scientific Unions. Committee on Science and Technology in Developing Countries. REPORT ON SCIENTIFIC INFORMATION IN EAST AFRICA. Prepared by Dr. D.J. Urquhart. COSTED 3/16. Rome, 15 October 1968.

A second impediment to the acquisition of printed publications and other information services from abroad derives from the special import restrictions imposed by some LDCs. To cite a recent case in point, a U.S. publisher was unable to lend a multivolume set of indices to a medical library in Colombia, for evaluation before purchase, because the institution could not obtain an import license for this purpose.

LDCs seeking to avail themselves of information assistance should be persuaded to liberalize foreign exchange and import controls hampering information transfer. It is recognized, however, that the problem lies not in the regulations themselves, but in the manner in which they are administered.

V

RECOMMENDATIONS

The developing countries increasingly require scientific and technical information to cope with the complex problems now facing them. The dearth of information in these countries and their limited capabilities for producing it stand in sharp contrast to the high rate of production and the immense quantity of information available in the United States and other developed countries. The gap between those who have knowledge and those who need it must be bridged. This situation calls for new perspectives, new policies, and new programs in our assistance efforts.

Although scientific and technical information is a ubiquitous element in virtually all of our technical assistance, and a common component in nontechnical forms as well, the totality of such aid with respect to information has not met the basic needs of developing countries. Recognizing the value and importance of information transfer as a distinct type of assistance--rather than an incidental element in other types of aid--is essential for perceiving the full potential of assistance in the field of scientific and technical information. The emphasis heretofore placed on the content of information transferred must be expanded to include the arrangements and mechanisms for transferring it. Therefore, the Panel makes the following recommendations:

A. Policies and Priorities

1. Assistance directed toward enhancing the transfer of scientific

and technical information to developing countries should be given high priority in the overall technical assistance program of the United States.

2. This assistance should focus on developing and strengthening the information infrastructure of these countries. In general, the effort should concentrate on strengthening existing institutions rather than creating new ones. In so doing, particular emphasis should be given to improving the coupling between these institutions and the ultimate users of information.

3. Assistance should also aim at making scientific and technical information more readily available and more easily accessible to developing nations. Emphasis should be placed on means for increasing the awareness of available information, as well as making it easier to acquire.

4. The assistance should serve as a catalyst for inducing attention and action on the part of LDCs. The need for scientific and technical information far exceeds the demand now expressed for it in many developing countries. Assistance should aim at increasing the demand and stimulating the LDC activity necessary to fulfill it.

5. Assistance provided by AID should supplement the efforts of developing countries. The development and strengthening of information infrastructure requires the commitment of significant resources over a considerable period of time. These resources must come, largely, from the developing countries themselves; AID's role should be to stimulate or supplement this larger effort.

6. Assistance to a country should be contingent upon its having, or developing, a coherently articulated policy regarding scientific and tech-

nical information. It is not enough for AID or other donor agencies to have a policy; recipients must have one, too. A critical first step in any AID-sponsored program should be assistance to the participating country in formulating such a policy.*

7. AID-sponsored assistance should be coordinated with the related assistance activities of other developed countries and international agencies. The scientific and technical information field is one in which the United States has probably unique capabilities for bilateral assistance, but its efforts should be closely coordinated and integrated with those of other donors. AID should encourage and participate in efforts toward international cooperation in this area, at both the policy and program levels. The network of institutions outlined in the Jackson Report** provides an excellent blueprint for supporting such efforts.

B. Programming and Administration

1. Assistance activities should not exclusively take the form of specially designed projects for the transfer of scientific and technical information, but should also constitute a significant component, wherever relevant, in other AID sector- or problem-oriented programs. Activities that help to focus available knowledge upon a given problem or sector (i.e., population growth, agriculture) are legitimate and necessary components of these larger programs and should be supported accordingly.

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*The need for such policies, and their goals and broader implications, are effectively presented in INFORMATION FOR A CHANGING SOCIETY-SOME POLICY CONSIDERATIONS, a Report to the Secretary-General of OECD, op. cit.

**U.N. Development Programme, A STUDY OF THE CAPACITY OF THE UNITED NATIONS DEVELOPMENT SYSTEM, op. cit., Chapter 6.

2. In programming information-type assistance activities, all forms of aid should be utilized; for example

a. Technical assistance to survey and define the problem, develop the approach to it, supplement available skills, and apply new techniques as needed in the course of the program;

b. Loans, as may be required, for developing facilities, including dollar loans and possibly loans of local and third-country currencies as needed and available;

c. Foreign currencies earned through the sale of surplus U.S. agricultural products and other commodities;

d. The use of U.S. surplus property when appropriate;

e. Research funds to develop new knowledge, or to synthesize existing knowledge and experience; and

f. Institutional grants for problems that are sufficiently long term and comprehensive to require extended effort.*

3. All programming should include the objective of developing a functioning information infrastructure before major assistance programs are phased out. Activities in ongoing programs should be progressively reviewed to ensure that their phase-out, or termination, does not occur before an information infrastructure has been established for each major activity.

4. Appropriate guidance and assistance should be given interested

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* In the case of institutional grants directed to purposes other than information activities (e.g., agriculture, health, education, science policy, industrialization and technology transfer), an effort should be made to engender an active concern for strengthening the LDC information infrastructure in the areas covered by the grants. (See program recommendation P-11, page 58.)

countries not currently receiving U.S. development assistance, as available resources permit. This assistance should be made available particularly to develop national and regional policies for information, to provide advice on the building of information infrastructure, and to devise means for increasing accessibility to U.S. scientific and technical information.

5. An administrative unit should be established within AID to implement these policies and programs. This unit should provide a single focus of responsibility for AID's scientific and technical information activities. It should be charged with developing and directing information-oriented assistance programs and with providing technical advice and coordination services to other assistance efforts of which the transfer of information is a significant component. The organizational location of the unit within the AID structure should be appropriate to its responsibilities.

In carrying out these responsibilities, the scientific and technical information unit--through its own efforts and/or through arrangements it may make with others--should follow these procedures:

a. Identify in collaboration with interested individual countries the information needs of each and evaluate the effectiveness of information transfer. In order to formulate relevant and effective assistance programs, to evaluate the payoffs from information projects and to assess their role in technical assistance, the unit should continually be determining the types of information needed by LDCs, the sectors and organizations needing it, the most appropriate means for transferring it, and the actual uses made of the information.

b. Develop methods and guidelines for assessing and improving the information-management capabilities of each. The success of many assistance programs, especially in major areas such as agriculture and population, depend critically upon the capabilities of LDCs to manage the information-transfer component. However, methods for assessing these capabilities and guidelines for improving them are lacking. A first step toward rectifying this could be the establishment of a working group with on-site experience in major program areas which would survey its experiences with information transfer, identify major problems encountered, assess present LDC capabilities for coping with them, and specify the policies, procedures, and facilities needed for better management of information.

c. Improve the retrievability and utilization of information obtained from assistance programs. Such programs are themselves a valuable information repository, especially in respect to assistance experience and sources of various kinds of expertise; often, however, the information is inaccessible.

. The scientific and technical information unit should have an advisory panel for policy and program guidance. The panel should be concerned not only with broad policy matters but also with the design of programs and the evaluation of their effectiveness. Comprised of members well acquainted with information transfer in developing countries, the panel should meet regularly to provide continuous and informed guidance. Members of the panel should be able to conduct on-site visits to LDCs in connection with potential and operational information programs.

Suggested Programs

The need to give information transfer greater attention and higher priority in technical assistance is the major thesis of this report. If this thesis is accepted, opportunities will open up for specific projects. The Panel has prepared for consideration brief summaries of several such projects. Although a complete assessment of their feasibility and probable effectiveness was not possible, the projects are regarded as promising and merit more detailed consideration.

The Panel is aware of related efforts and similar projects that have been proposed and attempted. These previous efforts should be reviewed for the guidance they may offer in assessing the present proposed projects.

The projects in the following pages are arranged in two broad groups: the first eight directly concern the three priority areas--industrial technology, natural resources, and scientific and technical disciplines; the remaining five are more broadly applicable. In the first group, projects 1-4 concern industrial technology; 5 and 6, natural resources; and 7 and 8, science information. Their order of presentation indicates the relative priority--in the Panel's judgment--of each project within each field. Of the remaining projects, 9-12 seek to capitalize upon existing capabilities and opportunities, and projects 13 and 14 are aimed at developing information centers in LDCs.

P-1

Program Title: Industrial Development Information

Objective: To provide LDCs with information for planning and promoting their industrial development

Approach: The strategies and policies adopted to produce industrial growth involve many complex issues and decisions relating to employment opportunities, available resources, markets, social impacts, environmental effects, etc. These strategies and issues are the subjects of a growing body of literature on the planning and promotion of industrial development, which includes studies of appropriate technologies and employment, procedures for selecting industrial sectors for development, and the overall plans and programs formulated by LDCs for industrialization. This literature could be of considerable use to the planning ministries of LDCs by providing them with an information base for guiding industrial planning and promotional activities. The acquisition of this information, which is scattered among diverse sources, and its transfer to LDCs might be accomplished through an information analysis center. The center should provide reviews and critical analyses of the problems, prospects, and trends in industrial development. These reviews and analyses, as well as general information on the topic, should be disseminated directly to LDC ministries charged with industrial development, and to other organizations involved in the planning and management of industrialization. The proposed effort would complement related activities of the OECD, UNIDO and other multinational organizations.

P-2

Program Title: Technical Information Services for Industry

Objective: To develop the capabilities of LDC institutions to assume responsibility for the stewardship of industrial information services

Approach: Little effort has been made to develop the infrastructure needed to provide information services for LDC industries. The missing element is an "interface institution" to serve as the coupling mechanism between industry and the existing information infrastructure. Pilot projects in three or four LDCs could develop the capabilities of an interface institution that would provide the information stewardship for a major segment of the industrial community. Appropriate institutions for this role, probably differing from one LDC to another, would be industrial associations, industrial R & D institutes, or productivity centers. Whatever the type, the selected institution should possess certain features: Its raison d'être should be to service the industrial community; it should know the needs and problems of industry, and the information required to meet them ; and it should be a potent organization, national in scope, and closely coupled to industry. In this stewardship role, the interface institution would promote the demand for, and use of, information; help elucidate industry's needs; direct inquiries to appropriate sources; and ensure that the acquired information is responsive to inquiries. In so doing, it should make maximum use of the existing LDC information infrastructure.

P-3

Program Title: Village Technology Centers

Objective: To develop LDC centers for village-level technology

Approach: In most LDCs there is a great need for technologies that are simple, labor-intensive, and capital-saving. To be accepted and widely adopted, these technologies must also be compatible with various physical and cultural characteristics of particular LDCs. To meet these needs and conditions, consideration should be given to inaugurating village technology centers, located in LDCs and staffed entirely, or largely, by indigenous personnel. The principal functions of the centers would be to identify technological needs, adapt available technologies to these needs and to local conditions, develop new technologies as required, and introduce and disseminate appropriate technologies. Multiple sponsorship--AID, LDCs, and regional organizations--should be considered. The entire effort should be undertaken as a pilot program to be carefully planned and assessed throughout its development and operational phases. Activities of individual centers should be coordinated to enhance the concentration of effort and to avoid duplication. An independent organization that is well acquainted with this type of technology and its dissemination should be engaged to provide technical advisory services to the centers and to coordinate their activities.*

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*The experiences of Volunteers for International Technical Assistance, Inc. (VITA), the United Kingdom's Intermediate Technology Development Group (ITDG), and France's Centre d'Etudes et d'Expérimentation du Machinisme Agricole Tropical (CEEMAT) should be considered in assessing this project.

P-4

Program Title: Industrial Equipment and Machinery Information

Objective: To provide LDCs with information needed for selecting and acquiring industrial equipment and machinery

Approach: LDC industries, especially the small- and medium-size enterprises, are often unaware of available manufacturing and test equipment; its performance characteristics, costs, conditions for purchase; and installation and operation procedures. Such information, it has been found, is frequently requested by individual firms in LDCs, but there are often no known or ready means for identifying the suppliers of industrial machinery and for acquiring the desired information. This problem could be ameliorated simply by the greater distribution of directories of equipment suppliers, trade catalogs, and literature of firms to LDCs. Toward this end, assistance could be provided (perhaps in collaboration with the Department of Commerce) in obtaining directories and in encouraging U.S. equipment suppliers to send their catalogs and other literature to specified industries or dissemination centers within the LDC. To provide the necessary linkage and simplify the distribution, the information could be directed to national trade and industrial associations, which could disseminate the information to individual enterprises. Further, such dissemination centers could be assisted in developing a system for continually acquiring such information. This effort would complement similar UNIDO services.

P-5

Program Title: Natural Resources Information Services of Regional Institutions

Objective: To improve the use and management of natural resources

Approach: A number of regional institutions have been established within the developing world for research or training in certain areas of natural resources, especially agriculture. Some of these institutions have effective information-transfer programs, but others could serve a larger and more effective role as channels for the transfer of natural resources information to and between LDCs. To do so, assistance should be provided to expand and improve the information services of such institutions.* Information services of natural resources institutions (e.g., those concerned with water, minerals, and forestry) should concentrate on methods and equipment for finding, evaluating, exploiting, and managing resources; this information should be directed to the LDC institutions that are responsible for surveys, research, and training, and to government ministries charged with the use and management of resources. The information services of agricultural institutions should be directed to acquiring and disseminating information regarding new and improved practices for increasing productivity; this information should be transferred to the extension services of LDCs in the region. Assistance should be in the form of long-term grants for information services, to be defined and developed by the institutions themselves without undue direction and prescription from the assisting agency.

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*Such as the Centro Internacional de Agricultura Tropical, the Instituto Centroamericano de Investigación y Tecnología Industrial, and the East African Agriculture and Forestry Research Organization, etc.

P-6

Program Title: Dissemination of Agricultural Practices

Objective: To improve the capabilities of LDC extension services to disseminate agricultural information

Approach: There are various simple, proven agricultural practices for preparing soil, planting, growing, and harvesting that could significantly increase the agricultural productivity of many LDCs. These practices, however, are unknown to many farmers, and most extension services do not now have the capability to introduce them on a wide scale. As a pilot project, the agricultural extension services in a small number of LDCs should be assisted to provide greater dissemination of existing information on these simple agricultural practices to large numbers of farmers, most of whom are illiterate or semiliterate. Various methods of reaching and influencing this group should be investigated, including the training of farmers themselves to disseminate the information, cooperative efforts with other institutions (e.g., schools, churches), demonstration farms, and modern audiovisual techniques. Particular attention should be given to designing an information-and-materials package that the farmer can use without having to learn many new skills. The effectiveness of different approaches should be evaluated to determine which ones give the best results.

P-7

Program Title: Science and Engineering Secondary Literature

Objective: To increase the awareness of, access to, and use of the world's scientific and technical literature by LDC scientists and engineers

Approach: Many LDC scientists and engineers fail to make use of scientific and technical information because of the lack of means for reviewing the voluminous literature pertinent to their needs and activities. Manuals, handbooks, and engineering standards are often unavailable; whereas in the developed world, much of the scientific and engineering literature is regularly indexed, abstracted, reviewed, and summarized in secondary publications. Bibliographic control is provided by indexes; summaries of individual papers and books are available in publications of abstracts; state-of-the-art surveys of broad fields are provided by annual review series; and handbook publications summarize the information. The wider availability of these secondary information sources could increase their use by LDC scientists and engineers. Toward this end, university libraries and major research and technical centers in LDCs could be assisted in acquiring it. Assistance might take the form of contributions toward purchase of secondary literature, efforts to obtain reduced purchase rates, contributions to mailing costs, aid in securing import licenses (where needed), and help with currency conversion.

P-8

Program Title: Journals for LDC Institutions

Objective: To provide scientific and technical journals to education and research institutions in LDCs

Approach: Education and research institutions, as well as individual scientists and engineers in LDCs, are often unable to afford the scientific and technical journals published in developed countries. Many of these journals could be useful in teaching scientific and engineering students, in planning and conducting research, and in providing approaches and solutions to technical problems. Beyond this, journals often provide the only means for many LDC scientists and engineers to maintain contacts with the larger technical community and to update their knowledge. Therefore, means should be explored for providing journals to the developing world. One approach that should be investigated is a cooperative, cost-sharing project involving U.S. technical societies, publishers of scientific journals, and AID. In this approach, technical societies and publishers might bear all, part, or none of the low run-off costs of additional copies of their journals, and AID might provide the cost difference, as well as the cost of shipping the publications to LDC institutions. Journal packages should be carefully designed to match the size, activities, and capabilities of the recipient institutions, and it may be necessary, for fiscal reasons, to devise criteria for selecting the LDC institutions to which journals are to be sent. When operational, the project might be carried out most simply by the technical societies themselves, with AID support for transportation costs.

P-9

Program Title: LDC "Information Gatekeepers"

Objective: To increase the capabilities of AID-sponsored LDC trainees to serve as links between information sources in developed nations and organizations in their own countries

Approach: Several studies, here and abroad, have shown that a small number of individuals within an organization are responsible for keeping the members of that organization informed of pertinent scientific and technical information that is generated externally. These "information gatekeepers," who must be well integrated into the external networks of foreign information sources, as well as the network of domestic users, are best produced through on-the-job experience (rather than classroom training) in foreign countries. Thus, a natural medium for developing such "gatekeepers" is provided by the AID training programs that include on-the-job training for LDC personnel in developed countries. Where these conditions are met, an information-oriented component should be built into the overall training program. This could consist of (1) instruction in the characteristics and functions of "information gatekeepers," (2) encouragement of the trainees to accept such a role upon returning to their countries, (3) identification by trainees of the myriad information sources available, (4) instruction in how to obtain access to these sources, and (5) means for the trainees to maintain contacts with the information sources.

P-10

Program Title: Information Education-and-Training Audiovisual Materials

Objective: To promote an "information consciousness" and provide training in the methodologies of information sciences

Approach: The need for, and usefulness of, scientific and technical information is often unappreciated in LDCs, at the level of both national policy making and the potential user. Nor have most LDC librarians and information specialists adapted the various modern techniques for acquiring, processing, and disseminating information. In coping with similar, if not as severe, conditions, the United States and Europe have produced a range of audiovisual materials dealing with the role of information and the more technical aspects of coping with scientific and technical information. Some of these materials, which are catalogued in three recent directories,* could be used in LDCs for the same educational and training purposes. Available materials, after screening and selection, could be translated when necessary into the languages of the targeted LDCs.

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*Lieberman, Irving. A WORKING BIBLIOGRAPHY OF COMMERCIALLY AVAILABLE AUDIO-VISUAL MATERIALS FOR THE TEACHING OF LIBRARY SCIENCE. Urbana: University of Illinois Graduate School of Library Science, Occasional Paper no. 94, December 1968. 71 pp., index. (250-300 titles).

Klempner, Irving M. AUDIO-VISUAL MATERIALS IN SUPPORT OF INFORMATION SCIENCE CURRICULA: AN ANNOTATED LISTING WITH SUBJECT INDEX. Washington, D.C.: ERIC Clearinghouse on Library & Information Sciences, June 1971, 25 pp., index. (195 titles).

van der Aa, H.J. AUDIOVISUAL MEDIA FOR COMPUTER EDUCATION. Amsterdam: Netherlands Centre for Informatics, 1971. 47 pp., index. (452 titles).

P-10, cont.

Several packages could be assembled and widely circulated, by appropriate indigenous professional associations or regional organizations (such as the Regional Technical Aids Center, Mexico/Buenos Aires). These packages should include materials that treat the broader dimensions of information usage and management, as well as specific techniques of acquisition, storage, and retrieval. AID, regional organizations, and professional associations in both the United States and LDCs might jointly sponsor and carry out these projects.

P-11

Program Title: Effectiveness of Information Infrastructures

Objective: To develop guidelines for evaluating information infrastructure

Approach: If AID is to provide assistance for building and strengthening information infrastructures, it needs guidelines for diagnosing problems and for prescribing remedies. Since there is no body of theory, the guidelines must be derived from experience. Furthermore, the experience must cover an entire sector of technical activity in a representative culture if the guidelines are to be broadly useful. The problem areas in which AID has made its institutional grants (Indian agriculture, population in several countries) have these characteristics. In addition, the institutions receiving these grants meet periodically to exchange information on the technical and institutional aspects of their programs. No special emphasis has yet been placed on their experiences with information infrastructures, but many of these grantees have accumulated experience that may be valuable to review and to consolidate into evaluation guidelines. This review would best be carried out through one conference for each group of grantees, in the course of which the effectiveness of each of the information-transfer functions outlined in this report would be assessed and then related to the performance by a part of the responsible infrastructure. The resulting guidelines, even if they are very general, could be useful in directing assistance toward strengthening the information infrastructures of LDCs and, at the same time, in drawing attention to the need for better guidelines and better reporting on LDC information management.

P-12

Program Title: Information Transfer by U.S. Educational Institutions

Objective: To engage U.S. educational institutions in the transfer of scientific and technical information to developing countries

Approach: U.S. colleges and certain secondary schools (especially technical and vocational institutions) possess a great potential for transferring scientific and technical information to LDCs. This potential, however, has not been fully explored to determine how these institutions could direct their interests and resources toward providing such transfers. To do so, the institutions must have means for knowing the specific needs of LDCs, and ways of responding to them that are consistent with their teaching-research functions. These tasks may be accomplished by coupling certain programs of the colleges and schools (e.g., agriculture, engineering, and industrial technologies) to the needs of developing countries by having the schools respond to requests for scientific and technical information. Such a coupling would provide the institutions with knowledge of LDC needs and appropriate response modes. This effort should be started on a pilot basis with a small network of institutions to develop, adapt, and evaluate the effectiveness of the model as an information-transfer mechanism. If successful, other institutions could be added to the network later. Overall direction of the program should be provided by an organization experienced in managing the transfer of information; this same organization should arrange the coupling between the LDCs and the participating U.S. institutions.

P-13

Program Title: Country Information Centers

Objective: To develop and operate a document storage and retrieval system for indigenous and foreign development specialists working in LDCs

Approach: Often there is much information pertinent to the development of a given LDC, but it is usually scattered among many places. As a result, much of the available information is unknown and unused. A country information center could correct this situation by acquiring, abstracting, indexing, and storing documents of interest to individuals conducting, or managing, development programs in the country. The center would aid individual users by formulating information-gathering strategies and by supplying him with information source materials. Typical services would be replies to quick-response requests and preparation of special bibliographies and monthly accession lists. The center would concentrate on bringing together the items concerned with development from all sources, including development reports, monographs, surveys, articles from periodicals, maps, theses and dissertations, speeches, trip reports, symposia and conference proceedings, and statistical yearbooks. The purpose would be to hold a specialized collection of specific items relating to development and to provide active service to users.

P-14

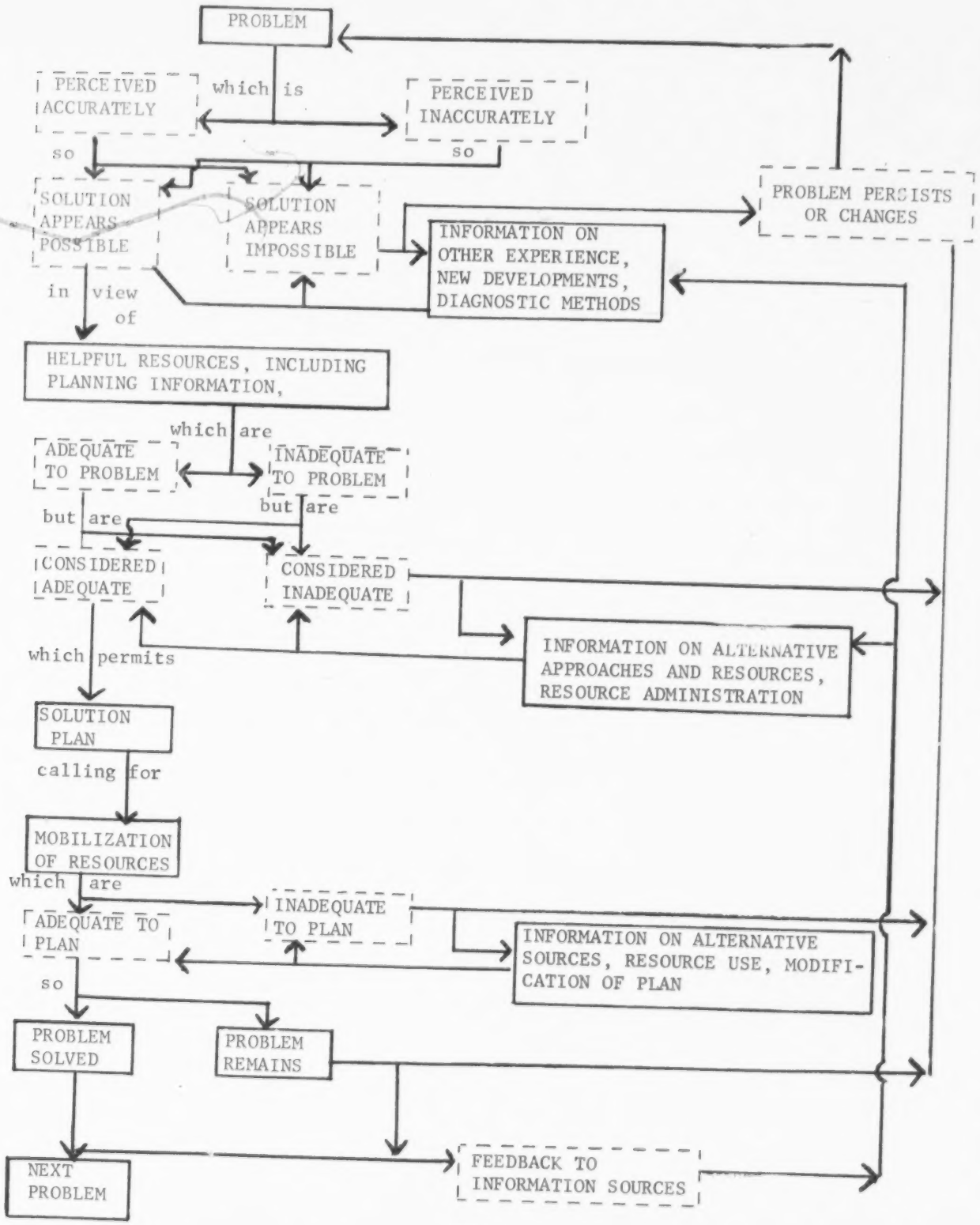
Program Title: Counterpart Information Centers

Objective: To provide LDC information centers with counterpart information centers in the United States

Approach: The use of "sister institution" relationships has been effective in providing example and assistance to help LDCs develop institutional capabilities. In the information area, a center in the United States and a center in an LDC could be designed to work as counterparts. The U.S. center would have a long-term responsibility to help the LDC(s) develop a comprehensive array of information activities: exchange arrangements, training, application of communications and information equipment, development of infrastructure, association with professional societies; and marketing, advertising, or education, as appropriate for users of the information system. The objective of the U.S. center would be to bring the LDC(s) into complete participation in the international information complex at a level that is meaningful and viable in the LDC(s). The U.S. center's commitment to a long-range (e.g., 5 years) obligation for counterpart development with the LDC(s) should provide an excellent learning and training opportunity for information workers. The continuing contact between the staffs of the "sister institutions" would provide for an opportunity for the U.S. staff to help define information needs of the LDC and to bring the best U.S. know-how to bear on the LDC problems.

APPENDIX A

SITUATIONAL DEFINITION OF DECISION MAKER'S "NEED FOR INFORMATION"



APPENDIX B

SELECTED ANNOTATED BIBLIOGRAPHY

The purpose of this Bibliography is to indicate the range of capabilities, resources, past and present programs of the United States, other donor countries, international organizations and the developing countries themselves, to facilitate the transfer of scientific and technical information to developing countries.

Much information on this subject, particularly on the actual capabilities and resources within developing countries, is elusive. It is buried in planning documents, agency reports, informal memoranda, personal letters and the like. That which is available is usually descriptive, rather than critically evaluative.

This listing includes only materials that are published or generally available. It is representative, rather than comprehensive. Many of the references cited are review articles, guides, or annotated bibliographies that may lead the reader to additional references or sources of information.

The NAS Board on Science and Technology for International Development is making a continuing effort to acquire, maintain, and update published and unpublished information on plans and programs for providing scientific and technical information to developing countries and would appreciate receiving copies, or notification, of pertinent materials on this subject.

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IV. DEVELOPING COUNTRIES
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- East Asia and the Pacific
- Latin America
- Near East and South Asia

I. UNITED STATES

General

1. Agency for International Development. BOOK, TEXTBOOK AND LIBRARY DEVELOPMENT. A SELECTED LIST OF REFERENCES FOR AID TECHNICIANS. AID Bibliography Series, Education and Human Resources No. 1. Washington: December 15, 1970, 36 pp.

-- an annotated bibliography of 133 reports on programs of AID, international agencies, various foundations and organizations, and private individuals.

2. American Library Association. International Relations Office. WHO IS DOING WHAT IN INTERNATIONAL BOOK AND LIBRARY PROGRAMS. Washington: October 9, 1967, 82 pp.

-- reviews policies, programs and activities of 31 U.S. and international organizations.

3. Bryd, Cecil K. (issue ed.) THE INFLUENCE OF AMERICAN LIBRARIANSHIP ABROAD. Special Issue of LIBRARY TRENDS, 20, no. 3, January, 1972.

-- reviews and analyses U.S. professional participation in overseas book, library assistance, educational and consulting programs during the last 25 years. Proposes steps to make library, documentation and information assistance more successful in developing nations.

4. "Gift Book Programs for Libraries" LIBRARIES IN INTERNATIONAL DEVELOPMENT, Issue no. 19, February, 1970, pp. 1-5.

-- reviews programs of 14 U.S. organizations for distributing scientific and technical books overseas.

5. Goodwin, Craufurd D. "The International Involvement of American Libraries." Appendix F-1, A in Douglas Knight and E. Shepley Nourse (eds.) LIBRARIES AT LARGE: TRADITION, INNOVATION AND THE NATIONAL INTEREST. New York: R.R. Bowker Co., 1969, pp. 559-589.

6. Hiebert, Ray E. (ed.) BOOKS IN HUMAN DEVELOPMENT. Washington: The American University, 1965, 131 pp.

-- report of a conference sponsored by the Agency for International Development and American University.

7. Lorenz, John G. "International Transfer of Information." in Carlos A. Cuadra (ed.) ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY. Chicago: Encyclopedia Britannica, Inc., 1969.

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8. Agency for International Development. APPLICATION OF MODERN TECHNOLOGIES TO INTERNATIONAL DEVELOPMENT. (AID-OST-72-1). Washington: January, 1972.

-- first issue of an experimental quarterly abstracting journal, sponsored jointly by AID and the National Technical Information Service, U.S. Department of Commerce. Designed to increase availability to LDCs of U.S. technical publications in areas of Chemistry; Materials; and Mechanical, Industrial, Civil and Marine Engineering.

9. "The American Library Presence Abroad." Appendix D of 7TH ANNUAL REPORT OF THE U.S. ADVISORY COMMISSION ON INTERNATIONAL, EDUCATIONAL AND CULTURAL AFFAIRS. 91st Congress, 2nd Session. Washington: U.S. Government Printing Office, April 21, 1970.

-- presents recommendations concerning U.S. Government activities and concentration of efforts to improve assistance for library development in emerging nations. Recommendations focus on national planning, training, development of collections and services, and mechanisms for pilot projects, coordination and evaluation.

10. Glaser, Peter E., et al. SPACE TECHNOLOGY TRANSFER AND DEVELOPING NATIONS. Washington: National Aeronautics and Space Administration, 1968, 153 pp.

-- describes a pilot study to determine feasibility of using space-generated technology to meet needs of a developing country (Brazil). Availability of pertinent advanced technology was assessed by using the NASA Scientific and Technical Information System and the services of the NASA Technology Utilization Program.

11. Nixon, Richard M. U.S. FOREIGN POLICY FOR THE 1970's: BUILDING FOR PEACE. A Report to the Congress by the President of the United States. Washington: The White House, February 25, 1971, pp. 220-221.

12. U.S. Department of Health, Education, and Welfare. INVENTORY OF FEDERAL PROGRAMS INVOLVING EDUCATIONAL ACTIVITIES CONCERNED WITH IMPROVING INTERNATIONAL UNDERSTANDING AND COOPERATION. Washington: U.S. Government Printing Office, 1969, 545 pp.

-- reports on 159 programs of 31 U.S. federal agencies, carried out during fiscal years 1966, 1967, 1968. Includes descriptions of information-oriented programs, such as information-exchange programs, development of libraries, participant-training programs, exhibits services, foreign currency programs, etc.

13. U.S. Department of State. A GUIDE TO U.S. GOVERNMENT AGENCIES INVOLVED IN INTERNATIONAL EDUCATIONAL AND CULTURAL ACTIVITIES. Washington: U.S. Government Printing Office, September, 1968, 188 pp.

-- descriptive summaries of programs of 26 agencies of the Federal Government. Includes information-oriented programs.

14. U.S. Department of State. NATIONAL POLICY STATEMENT ISSUED ON INTERNATIONAL BOOK AND LIBRARY ACTIVITIES. Press Release and Text of Statement. Washington, January 12, 1967.

-- policy statement approved by President Lyndon Johnson, in which "the United States Government declares that it is prepared, as a major policy, to give full and vigorous support to a coordinated effort of public and private organizations aimed at making book and library resources more available, and facilitating the free and full exchange of ideas, experiences and information among the nations of the world." More than 20 specific courses of action are directed to U.S. government agencies to implement this national policy.

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22. University of Pittsburgh. Graduate School of Library and Information Sciences. INTERNATIONAL LIBRARY INFORMATION CENTER. Pittsburgh: n.d. (Brochure).

-- describes collections and activities of this special library of primary source material on librarianship, documentation, and information science abroad. Holdings are particularly strong in the area of national library development and planning, and include plans from many of the developing countries. The Center has compiled lists of its holdings, including a bibliography of 150 reports on U.S. technical assistance missions relating to book, library, and information programs carried out during 1950-1969.

23. "USIA Information Center Service." INFORMATION ACTION. (a Member Services Bulletin of the Information Industry Association). 2, no. 18, February 2, 1971, p. 1.

-- describes actions being taken by the Association to introduce USIA libraries and their foreign constituencies to U.S. information industry products, services, and systems.

II. OTHER DONOR COUNTRIES

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-- describes organization and proposed programs of International Development Research Centre, Ottawa, Canada, established by the Canadian Parliament to sponsor scientific and technological research to assist underdeveloped areas. Two of the Centre's five functional divisions are concerned with a) development communications, and b) information services, including a library of development resources.

25. German Foundation for Developing Countries. DEVELOPMENT INFORMATION CLEARING HOUSES. Reports and Documents of an International Symposium, Berlin, November 3-7, 1969. Bonn: 1969.

-- included among the reports is a description of the Central Documentation Centre of the German Foundation for Developing Countries, and its function as a national clearinghouse in the field of development aid.

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-- objectives of center, established in 1970 by Indo-Soviet Joint Committee for Scientific Collaboration are to acquire and make current Soviet scientific and technical literature available to Indian academic and research scientists.

32. Secrétariat d'État aux Affaires Étrangères. LE SERVICE DE LA COOPERATION CULTURELLE, SCIENTIFIQUE ET TECHNIQUE AVEC LES ÉTATS FRANCOPHONES AFRICAINS ET MALGACHE. Paris: May, 1971.

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-- describes project being carried out by the Japanese Government's Overseas Technical Cooperation Agency and the Association for International Technical Promotion, to assist Asian nations in authoring and publishing technical books in local languages.

III. INTERNATIONAL ORGANIZATIONS

General

34. Organization for Economic Cooperation and Development. INFORMATION ACTIVITIES OF MAJOR INTERNATIONAL ORGANIZATIONS. Paris: 1971, 175 pp.

-- includes data on 36 major international governmental, nongovernmental, and regional organizations, with an indication of their main objectives and structures.

(Note: for references to activities of regional governmental and non-governmental organizations in developing areas, see Section IV.)

Intergovernmental

35. Food and Agriculture Organization. THE DIRECTOR-GENERAL'S PROGRAMME OF WORK AND BUDGET FOR 1972-73. (C71/3) Rome: March, 1971, pp. 251-260.

36. _____. THE WORK OF FAO, 1970-71. (C71/4). Rome: August, 1971, pp. 86-89.

37. _____. NOTE ON THE PROPOSED INTERNATIONAL INFORMATION SYSTEM FOR THE AGRICULTURAL SCIENCES AND TECHNOLOGY (AGRIS). (C/71/INF/13) Rome: November 11, 1971.

-- three publications describe current programs and proposed budgets and activities of FAO in areas of public information; development-support communications; documentation, including the operation of the FAO Documentation Centre, and the development of the International Information System for the Agricultural Sciences and Technology (AGRIS) and the Computerized Agricultural Research Information System (CARIS); the FAO library; and the FAO publications program.

38. International Atomic Energy Agency. EASING ACCESS TO NUCLEAR INFORMATION. Press Release (PR 70/67). Vienna: 23 November, 1970.

-- describes first regional seminar for Asia and the Far East on preparation of input for the International Nuclear Information System (INIS), in Bombay, with participants from Australia, Burma, India, Indonesia, Japan, Korea, Pakistan, the Philippines, Thailand, and the USA.

39. International Labor Office. ISIS-INTEGRATED SCIENTIFIC INFORMATION SYSTEM. Geneva: 1971, 115 pp.

-- describes computerized information system operating within the Central Library and Documentation Branch of ILO. Contains some 45,000 abstracts of books, periodical articles, and other documents; provides a search service to research staff of ILO and other UN agencies.

40. Organization for Economic Cooperation and Development. INVENTORY OF MAJOR INFORMATION SYSTEMS AND SERVICES IN SCIENCE AND TECHNOLOGY. Paris: OECD, 1971, 340 pp.

-- describes 136 major information services and systems in science and technology, including social sciences, concentrating on mechanized and important traditional systems.

41. _____. INFORMATION FOR A CHANGING SOCIETY. SOME POLICY CONSIDERATIONS. Paris: September, 1971, 50 pp.

42. Donne, R. "Activities of the OECD and its Development Centre in the Field of Documentation." Presented at the Meeting of the General Assembly, International Federation for Documentation, Buenos Aires, 17-18 September, 1970, 3 pp.

43. United Nations. WORLD PLAN OF ACTION FOR THE APPLICATION OF SCIENCE AND TECHNOLOGY TO DEVELOPMENT. New York: 1971.

-- recommends a systematic and adequately supported effort to improve transfer of knowledge and technology during Second Development Decade, and identifies scientific and technical information requirements in specific areas of natural, mineral, water, energy and atmospheric resources; food and agriculture; health; and application of new technologies.

44. _____. A STUDY OF THE CAPACITY OF THE UNITED NATIONS DEVELOPMENT SYSTEM. New York: 30 September, 1969, 2 vols.

-- Chapter 6, "Information Systems Concept," deals with conceptual design of an information system to support the activities of the UN development system. The proposed design builds on the findings and recommendations of other aspects of the Capacity Study, and insofar as possible, links those recommendations with current or planned work on information systems development under way throughout the UN system.

45. United Nations Educational, Scientific and Cultural Organization. APPROVED PROGRAM AND BUDGET FOR 1971-1972. (16C/5 Approved). Paris: March, 1971. Part II, Chapter 4 (Communications), pp. 307-364.

-- gives details of activities and budget ($414,201,400) of UNESCO's 1971-72 Communications program. Activities of particular relevance to scientific and technical information needs of LDCs include studies of the impact of new technology on the international circulation of information; developing measures to overcome tariff and trade barriers to the circulation of information (to be considered by UNCTAD, GATT, and common market organizations); developing proposals for reduction of transport charges for books and other forms of information (for consideration by the International Air Transport Association); establishment of the international copyright information center; studies

on, promotion of, and assistance to member states in the uses of space communications; promotion of book production and distribution; promotion of the exchange of information and research in documentation, libraries, and archives; pilot projects, training programs, and technical assistance for the planning and development of documentation, library, and archives services; and the development of a computerized documentation service for UNESCO, which will also function as a demonstration and training center for documentalists and information specialists from member states, particularly LDCs.

46. _____. DRAFT PROGRAMME AND BUDGET FOR 1973-1974. (17C/5 Revised). Paris: 1972. Chapter 2 (Natural Sciences and Their Applications to Development). pp. 25-38.

47. _____. LONG TERM PLAN, 1973-1978. (17C/4 Revised). Paris: 1972. Chapter 2 (Natural Sciences and Their Application to Development). pp. 19-25.

-- gives details of UNESCO draft budgets and programs during 1973-78 to implement programs for establishment of UNISIST. Proposes specific programs to meet special information needs of LDCs, including: 1) coordinating international efforts in assisting LDCs; 2) identifying LDC information needs; 3) assisting LDC member states in formulating national and regional programs and projects, and requests for their financing; and 4) creating training centers and fellowship programs.

48. _____. and the International Council of Scientific Unions. UNISIST: STUDY REPORT ON THE FEASIBILITY OF A WORLD SCIENCE INFORMATION SYSTEM. Paris: UNESCO, 1971, 161 pp.

49. _____. _____. UNISIST: SYNOPSIS OF THE FEASIBILITY STUDY ON A WORLD SCIENCE INFORMATION SYSTEM. Paris: UNESCO, 1971, 92 pp.

50. _____. _____. FINAL REPORT, INTERGOVERNMENTAL CONFERENCE FOR THE ESTABLISHMENT OF A WORLD SCIENCE INFORMATION SYSTEM, PARIS, 4-8 October, 1971. Paris: UNESCO, December, 1971, 60 pp.

51. _____. _____. UNISIST. Working Group on Scientific Information in Developing Countries. "Papers," in PROCEEDINGS OF THE UNESCO-ICSU STUDY ON THE FEASIBILITY OF A WORLD SCIENCE INFORMATION SYSTEM - UNISIST. Paris: UNESCO, 1971.

-- final report of the Working Group describes parameters of minimum base needed by a developing country to benefit from a world science-information system, and outlines a series of actions to be taken by developing countries to interface with UNISIST. Other working papers on the following topics: classification of positions and personnel in special libraries and information centers; needs of Latin American countries with particular relationship to the aims of UNISIST; information needs of the working scientists in R & D activities in

Central Africa; the role of scientific information in the science policy of developing countries; and an evaluation of the activities of selected scientific information centers in developing countries.

52. "A Summary of UNESCO's Activities in the Fields of Libraries, Documentation and Archives, 1967-1971." UNESCO BULLETIN FOR LIBRARIES, 25, no. 6, November-December 1971, pp. 318-331.

-- lists UNESCO's activities (regional institutions, pilot projects, seminars, courses, experts, fellowships, equipment, and meetings) carried out 1967-1971, primarily in developing countries of Africa, Asia, Oceania, and Latin America, for the development of libraries, documentation, and archives. Updates earlier survey of activities during 1946-66 published in September-October 1966, issue of the BULLETIN (20, no 5. item no. 297). In most cases, specific reports on each activity have been published by UNESCO's Department of Libraries, Archives and Documentation.

53. United Nations Industrial Development Organization. INDUSTRIAL INFORMATION. UNIDO Monographs on Industrial Development No. 13. New York: United Nations, 1969.

54. _____. PROGRAM OF WORK FOR 1972, REPORT OF ACTIVITIES IN 1970 AND UPDATING OF 1971 PROGRAMME. Part I (ID/B/80, 2 March, 1971), p. 34. Part II (ID/B/80 Add. 2, 22 February, 1971), pp. 35-51.

-- describes activities of the Industrial Information Division of UNIDO to assist LDCs in establishing and strengthening national and regional facilities for promoting the use of industrial information. Operational projects include provision of advisors and experts and recruitment of industrial-information officers; developing regional industrial information and extension services in Africa, Latin America, and Asia; seminars on industrial information; fellowship programs; and provision of equipment for information centers.

The Division also carries on a number of supporting and other activities, including interregional courses for upgrading industrial information personnel; seminars for industrial information officers; development of a network of correspondents for the rapid transfer of industrial information to LDCs; publication of guides, manuals, directories, etc. for industrial information personnel; the Industrial Inquiry Service; the Advisory Service on the Supply of Industrial Equipment; the Roster of Industrial Consultants; provision of specialized library and documentation services to UNIDO headquarters and field staff; development of the Industrial Information Processing System (INDIS); and the publication of Industrial Research and Development News, Industrial Development Abstracts, and the UNIDO Newsletter.

Expenditures for such activities were $633,500 in 1970; estimated resources for 1971 and 1972 are $666,200 and $703,700 respectively.

55. World Meteorological Organization. World Weather Watch. COLLECTION,

STORAGE AND RETRIEVAL OF METEOROLOGICAL DATA. (Planning Report no. 28). Geneva: 1969, 17 pp.

56. _____. FURTHER PLANNING OF THE STORAGE AND RETRIEVAL SERVICE. (Planning Report no. 32). Geneva: 1970.

Nongovernmental

57. "FID Projects in 1972." FID NEWS BULLETIN, 22, no. 3, March, 1972, pp. 33-34.

-- includes descriptions of activities of the International Federation for Documentation, its Regional Commissions for Latin America and Asia and Oceania, and its Study Committee on Developing Countries, directed toward assisting developing countries.

58. International Council of Scientific Unions. Abstracting Board. SURVEY OF THE ACTIVITIES OF THE ICSU SCIENTIFIC UNIONS, SPECIAL AND SCIENTIFIC COMMITTEES AND COMMISSION OF ICSU IN THE FIELD OF SCIENTIFIC INFORMATION DURING THE YEAR 1970. Paris: ICSU/AB Secretariat, September, 1971.

59. International Federation of Library Associations. IFLA ANNUAL, 1970. Copenhagen: Scandinavian Library Center, 1971, pp. 24-27.

-- describes interest and activities of IFLA in assisting developing countries.

60. "Standards - Key to Progress in Developing Countries." ISO BULLETIN, October, 1970, p. 6.

-- Working Group of the ISO Development Committee (DEVCO) was established at the 1970 Ankara meeting of the International Organization for Standardization, to consider the special needs of developing countries for standards information and the creation of an effective technical information center to meet these needs.

61. World Association of Industrial and Technological Research Organizations. WAITRO DIRECTORY. Vancouver, Canada: February, 1972, 61 pp.

-- provides information on operations and services of 74 industrial research institutes (in 49 countries) that are members of WAITRO. Includes data on library/information collections of institutes, and whether they provide technical information services.

62. "World Federation of Engineering Organizations--WFEO." FID NEWS BULLETIN, 19, no. 9, 15 September 1969, p. 84.

-- describes organizational meeting of the WFEO Committee on Engineering Information, whose terms of reference include the following: to

identify deficiencies in the communication of engineering information and to promote the provision of means of remedying them, having particular regard to the needs of developing countries.

IV. DEVELOPING COUNTRIES

General

63. Allen, Thomas J. TECHNOLOGY TRANSFER TO DEVELOPING COUNTRIES: THE INTERNATIONAL TECHNOLOGICAL GATEKEEPER. (ED-052,796). Bethesda, Maryland: ERIC Document Reproduction Service, February 1971, 29 pp.

64. "Library Development--An Annotated Bibliography." LIBRARIES IN INTERNATIONAL DEVELOPMENT, Issue no. 15, July-August, 1969, pp. 1-6.

-- reviews role of libraries in developmental efforts. Areas covered include library planning, training, legislation, and national, university, school, and public library services in Africa, Asia, and the Near East.

65. Organization of American States. BASIC ELEMENTS OF PLANNING AND DESIGN OF NATIONAL AND REGIONAL INFORMATION SYSTEMS. Prepared for OAS by Battelle Memorial Institute, Columbus, Ohio. Preliminary Draft, no. 1, May 1971.

Africa

66. Cooney, Sean. THE EAST AFRICAN SCIENTIFIC LITERATURE SERVICE. A Report prepared for the Director, East African Agriculture and Forestry Research Organization. Dublin: An Foras Taluntais, November, 1968, 48 pp. + 5 Appendices.

67. International Council of Scientific Unions. Committee on Science and Technology in Developing Countries. REPORT ON SCIENTIFIC INFORMATION IN EAST AFRICA. Prepared by Dr. D.J. Urquhart. COSTED 3/16. Rome, 15 October, 1968, 17 pp., mimeo.

68. United Nations Educational, Scientific and Cultural Organization. EXPERT MEETING ON NATIONAL PLANNING OF DOCUMENTATION AND LIBRARY SERVICES IN AFRICA (DECEMBER 1970). WORKING DOCUMENT (COM/CONF 9/3, 14 August, 1970), and FINAL REPORT (COM/MD/18, 17 March, 1971). Paris.

-- a sequel to meetings on the same subject organized for Latin America in 1966, and Asia in 1967, the meeting covered the following topics: the role of documentation and library services in educational, social, and economic development in Africa; the present state of documentation and library services in Africa; library development in relation to African Book Development Programme; planning of documentation and library services; personnel; a long-term plan for documentation and

library development in Africa; and a specific plan for Uganda. A similar meeting for the Arab countries will be held in Cairo in 1972.

69. _____. Field Science Office for Africa. FINAL REPORT OF THE MEETING OF EXPERTS PREPARATORY TO THE CONFERENCE OF MINISTERS OF SCIENCE IN AFRICA (CASTAFRICA (SC-71/CONF.1/8). Nairobi: UNESCO, 25 November 1971.

-- proposes the following as a topic to be discussed at CASTAFRICA, the 1973 African ministerial conference on science, technology, and their application to development: international and intra-African institutional cooperation in scientific and technical documentation and information, including mobility of scientific and technical personnel. As a background document for the conference, UNESCO will prepare a survey of scientific and technical documentation and information services in Africa.

70. _____. _____. SURVEY ON THE SCIENTIFIC AND TECHNICAL POTENTIAL OF THE COUNTRIES OF AFRICA. Nairobi: 1970, 296 pp.

East Asia and the Pacific

71. Asian Productivity Organization. INTER-REGIONAL SERVICES. (brochure). Manila: APO Regional Information Unit, February, 1970.

72. International Federation for Documentation. Commission for Asia and Oceania. BACKGROUND PAPERS--FIRST GENERAL MEETING OF FID/CAO. Tokyo: FID/CAO, April, 1970.

-- includes (1) country reports of recent trends of information activities in Ceylon, India, Indonesia, Iran, Korea; (2) brief reports on mechanization of information processing/use in Ceylon and the Republic of China; and (3) descriptions of activities of (national) information centers in Australia, Ceylon, India, Indonesia, Iran, Japan, Korea, Pakistan, Philippines, Republic of China and Turkey.

73. Korean Scientific and Technological Information Center. (KORSTIC). DOCUMENTATION ACTIVITIES IN KOREA. Seoul: 1971, 64 pp.

74. Lee, Hwa-Wei (Asian Institute of Technology, Bangkok). AN APPROACH TO REGIONAL COOPERATION IN SCIENTIFIC AND TECHNICAL INFORMATION SERVICES FOR SOUTHEAST ASIA. Paper based on presentation at the Conference on Scientific and Technical Information Needs for Malaysia and Singapore, Kuala Lumpur, 24-26 September, 1971, 17 pp.

75. National Scientific Documentation Center (of Indonesia). IMPROVEMENT OF LIBRARY AND DOCUMENTATION FACILITIES IN THE FIELD OF SCIENCE AND TECHNOLOGY IN INDONESIA (29 pp.) and Selkarbobo, Pietoyo. SCIENTIFIC AND TECHNOLOGICAL INFORMATION (In Indonesia--Present Situation, Problems

and Projected Solutions). (14 pp.) Papers presented at Workshop on Industrial and Technological Research, sponsored by the U.S. National Academy of Sciences and the Indonesian Institute of Science, Djakarta, January 25-30, 1971.

76. Prabhavi-vadhana, C. "Documentation in Thailand." in PROCEEDINGS INTERNATIONAL CONGRESS ON DOCUMENTATION, TOKYO, SEPTEMBER, 1967. Tokyo: Science Council of Japan, 1967.

77. "The Registry of Scientific Services." TAICH News, no. 26, January, 1972, p. 2.

-- describes services provided by the Asian and Pacific Council to its nine member countries. Acts as a repository and clearinghouse of information concerning scientific and technical services applicable to development.

78. Science Council of Singapore. ANNUAL REPORT, January 1, 1969 - March 31, 1971. Singapore: Government Printing Office, September, 1971, p. 6.

-- provides details on a study carried out in 1969 recommending establishment of a scientific-technical information service in Singapore.

79. Shank, Russell. SCIENCE AND ENGINEERING LIBRARY AND INFORMATION SERVICE DEVELOPMENT IN SUPPORT OF RESEARCH AND DEVELOPMENT IN INDONESIA. (A Report to the Chairman of the Indonesian Institute of Science, LIPI). Washington: Smithsonian Institution, November, 1970, 22 pp.

80. United Nations Educational, Scientific and Cultural Organization. RESEARCH FACILITIES IN SCIENCE AND TECHNOLOGY IN ASIA. A PRELIMINARY SURVEY. Paris: 1968, 701 pp.

Latin America

81. Federative Republic of Brazil. "Expansion Factors: Scientific and Technological Policy." Chapter II in FIRST NATIONAL DEVELOPMENT PLAN. 1972/74. Brasilia: November, 1971. p. 55.

-- identifies, as a major element in the scientific and technological strategy of Brazil during 1972-1974, the establishment of a national system of scientific and technological information, whose main components are subsystems consisting of Scientific Information; Free Industrial Technological Information; Patented Technological Information; Information on Infrastructure and Services; Agricultural Information; and Collection and Dissemination of Information from Abroad.

82. Fondo Colombiano de Investigaciones Cientificas y Proyectos Especiales. "Francisco Jose de Caldas" (COLCIENCIAS). PROYECTO SISTEMA NACIONAL DE INFORMACION. RED DE COMMUNICACIONES. Bogota: May, 1971.

83. Hilton, Ronald. THE SCIENTIFIC INSTITUTIONS OF LATIN AMERICA, WITH SPECIAL REFERENCE TO THEIR ORGANIZATION AND INFORMATION FACILITIES. Stanford: California Institute of International Studies, 1970, 748 pp.

-- describes proposed Colombian national network for scientific and technical communication.

84. Johnson de Vodanovic, Betty. "El sistema nacional de informacion y documentacion en Chile." in CONFERENCIA REGIONAL DA FID. Rio de Janeiro: Instituto Brasileiro de Bibliografia e Documentacao, January, 1971, pp. 9-22.

85. Kinard, Sammy R. WORKING PAPERS OF THE SEMINARS ON THE ACQUISITION OF LATIN AMERICAN LIBRARY MATERIALS: LIST AND INDEX. Cuadernos Bibliotecologicos, No. 2, (Rev. 2). Washington: Organization of American States, 1971.

-- lists working papers presented at annual seminars since 1956, including several relating to scientific and technical information needs, services, resources, problems, etc. of the countries in Latin America and the Caribbean.

86. Organization of American States. Department of Scientific Affairs. Division of Policy and Planning. MISSION OF EVALUATION OF THE SYSTEMS OF DIFFUSION OF TECHNOLOGICAL INFORMATION IN URUGUAY, ARGENTINA, CHILE, PERU, BRAZIL, VENEZUELA, COLOMBIA, AND MEXICO. Division Document No. 21. Washington: OAS, January, 1971, 34 pp. + 2 Annexes.

87. Republica Argentina. Presidencia de la Nacion. Secretaria del Consejo Nacional de Ciencia y Tecnica. "Linea de Accion N° 6. Sistema Nacional de Informacion Cientifica y Tecnica." in PLAN NACIONAL EN CIENCIA Y TECNICA. OBJETIVOS, METAS, LINEAS DE ACCION. 1971-1975. Buenos Aires, 1971.

88. Shepard, Marietta Daniels. "The Organization of American States and Its Potential for Collaboration in the Improvement of Scientific Documentation in Latin America." in CONFERENCIA REGIONAL DA FID. Rio de Janeiro: Instituteo Brasileiro de Bibliografia e Documentacao, January, 1971, pp. 56-91.

89. Shepard, Marietta D. "Progress Report on the Seminars on the Acquisition of Latin American Library Materials." in FIFTEENTH SEMINAR ON THE ACQUISITION OF LATIN AMERICAN LIBRARY MATERIALS. FINAL REPORT AND WORKING PAPERS. Vol. 1. Washington: Organization of American States, 1971.

-- annual progress reports provide details on activities of OAS, international organizations, and U.S. private and government organizations directed toward development of libraries and information resources in Latin America and the Caribbean.

90. United Nations. Economic Commission for Latin America. BACKGROUND, ORGANIZATION AND PROGRAMMES OF THE LATIN AMERICAN CENTRE FOR ECONOMIC AND SOCIAL DOCUMENTATION. (E/CN.12/899). Santiago: 23 March, 1971.

-- The Center was established (1970) and is maintained with the financial support of the Netherlands Ministry of Cooperation, to: improve the availability and utilization of ECLA's own information resources; coordinate economic/social documentation and scientific/technical documentation in areas of interest to ECLA (contamination of the environment, utilization of maritime resources, sea-water desalination, exploitation of desert areas, energy uses, etc.); improve flow of information on external economic phenomena that affect the development of Latin America.

Near East and South Asia

91. "Central Investigations in the U.A.R." FID NEWS BULLETIN, 21, no. 7, 15 July, 1971, p. 82.

-- describes Committee for Scientific and Technical Sources of Information (COSATSI), established in the Arab Republic of Egypt by the Minister of Scientific Research, to investigate the present status and future requirements of the research communities with respect to the flow and transfer of scientific and technical information.

92. Harvey, John F., ed. FIRST SOUTHWEST ASIAN DOCUMENTATION CENTER CONFERENCE PROCEEDINGS, IRAN, PAKISTAN, TURKEY. April 5-9, 1970, Tehran. Tehran: Iranian Documentation Centre, June, 1970.

-- Sponsored by the Central Treaty Organization, conference explored methods for cooperation between the region's scientific and technical documentation centres. Proceedings present state-of-the-art reports, and a series of conference recommendations dealing with education and training; preparation of special directories, bibliographies, union lists, and thesauri; and inter-center cooperation.

93. "Industrial Information Centre for the Arab States." FID NEWS BULLETIN, 20, no. 10, October 15, 1970, p. 118-119.

-- describes activities of the Documentation and Industrial Information Centre, established in 1970 by the League of Arab States' Industrial Development Center for Arab States.

94. Kesavan, B.S. "Organization of National Documentation and Information Services in India." LIBRARY TRENDS, 17, no. 3, January, 1969, pp. 231-244.

95. "Libraries and Information Centres in Saudi Arabia." R & D PROJECTS IN DOCUMENTATION AND LIBRARIANSHIP (International Federation for Documentation). no. 5, June, 1971, p. 2.

-- describes project being carried out by Institute of Public Administration, Riyadh, Saudi Arabia, to assist in national planning of library and documentation activities.

96. Mohajir, A.F. "New Measures of Information Activities in Pakistan," FID/CAO NEWSLETTER, no. 2, December, 1970, pp. 19-22.

97. Saha, J. "Small Enterprises National Documentation Centre (SENDOC) in India." FID/CAO NEWSLETTER, no. 6, December, 1971, pp. 14-16.

98. Sinai, A. "Services of the Iranian Documentation Centre (IRANDOC)" in USERS OF DOCUMENTATION (Proceedings of the 35th FID Conference and International Congress of Documentation, Buenos Aires, 14-24 September, 1970). Buenos Aires: National Council for Scientific and Technical Research, 1971.

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